

N. A. Wood.

THE **C**ONDOR

A Magazine of Western
Ornithology



Volume XXXII

January-February, 1930

Number 1



COOPER ORNITHOLOGICAL CLUB

THE CONDOR

A Magazine of Western Ornithology

Published Bi-monthly by the Cooper Ornithological Club

Entered as second-class matter May 15, 1925, at the post-office at Berkeley, California,
under Act of Congress of February 28, 1925, Section 412, paragraph 4.

Issued from the Office of THE CONDOR, Museum of Vertebrate Zoology, Berkeley, California.

SUBSCRIPTION RATES

Three Dollars per Year in the United States, payable in advance.

Fifty Cents the single copy.

Three Dollars and Twenty-five Cents per Year in all other countries in the International Postal Union.

COOPER ORNITHOLOGICAL CLUB

Dues are payable in advance on January first for the calendar year: Three Dollars per year for members residing in the United States; Three Dollars and Twenty-five Cents in all other countries. Members whose dues are paid receive THE CONDOR without additional charge.

Send manuscripts for publication to the Editor, J. GRINNELL, Museum of Vertebrate Zoology, University of California, Berkeley, or to the Associate Editor, JEAN M. LINSDALE, same address.

Send dues, subscriptions, orders for back numbers of THE CONDOR and for the PACIFIC COAST AVIFAUNA series to the Business Managers, W. LEE CHAMBERS, Box 123, Eagle Rock, California, or JOHN McB. ROBERTSON, Box 123, Eagle Rock, California.

Issued January 20, 1930

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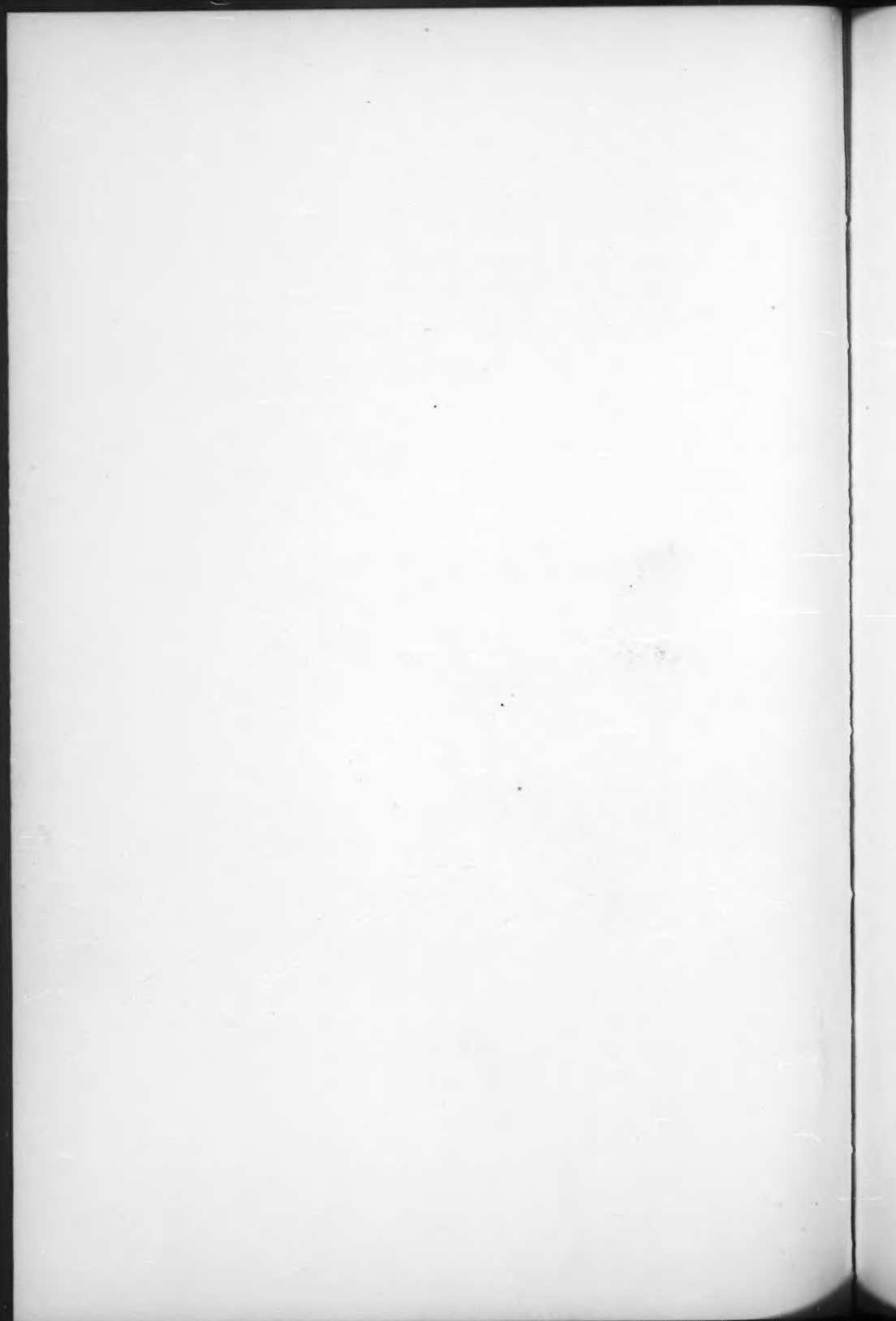
Edited by
JOSEPH GRINNELL

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VOLUME XXXII

BERKELEY, CALIFORNIA
1930



THE CONDOR

A BI-MONTHLY MAGAZINE OF
WESTERN ORNITHOLOGY

Published by the
COOPER ORNITHOLOGICAL CLUB

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JANUARY-FEBRUARY, 1930

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SPRING OBSERVATIONS ON CRANES IN FRESNO COUNTY, CALIFORNIA

WITH EIGHT ILLUSTRATIONS¹

By DONALD D. McLEAN

On March 13 and 14, 1929, the author with Mr. E. S. Cheney was making observations on the geese in the vicinity of Los Baños, when we became interested in the opportunity which there presented itself, of securing motion pictures as well as specimens of cranes (*Grus canadensis*). We started a search for these latter birds and finally found a large number of them on a ploughed field about four miles south of Firebaugh. "Gyp" corn had been planted there the year before and the birds were gleaning over the ploughed land searching out the heads of corn. The birds stalked about with a soldierly precision, and their rolling calls carried clearly over the field.

There were about 400 cranes in this field and they came to within 175 yards of the road. Every few moments a dance would take place. Two birds, sometimes three, would call vigorously *crrrr-uk-crrr-uk*, then face each other, spread their wings, and start to prance, each bound into the air being higher than the one before, until a height of eight or ten feet was reached. The necks were stretched upward and forward, the bills pointing up at an angle of about 45 degrees. The birds struck forward with their feet while in the air. The calls given while this dance was in progress were quite loud.

Occasionally, new birds would drop in, sailing gracefully down in a circle until within from forty to fifty feet of the ground. Then they would set their wings, dangle their legs and point the head and neck forward and slightly downward in an awkward position and drop down, each bird looking for all the world like an umbrella with the legs as a handle. As they began their final glide, they stretched both their feet and their heads forward and then started to back-pedal with their wings until nearly stopped, when they dropped to the ground, taking the jolt with bended legs. After landing, they generally looked about for a few moments and then started to feed. There was never a time but what some of the birds had their heads up gazing about watching for approaching danger. (See fig. 1.) As evening finally came, the flock took wing toward the southeast.

On March 18, 1929, we returned to the locality named above, but the birds were gone; so we went to a place south of Mendota, where we knew a flock had been located for some time. This piece of land was a large unfenced and un-

¹ By E. S. Cheney, courtesy of the California Division of Fish and Game.

plowed area, wet in spots, with scattered sage-bushes here and there over its surface. The grass was short, and in many places the ground was entirely bare with only a caked surface of dry alkali dust.

The work of digging blinds was undertaken by Mr. Cheney at night as that was the only time of the day in which the birds were sure to be absent from the field. Two blinds were installed, about a quarter of a mile apart. They were made to look like an ordinary sage-bush in size and form. The holes under the blinds were necessarily small, and a man could sit in one only by tucking his



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Figs. 1 and 2. LITTLE BROWN CRANES (*Grus canadensis*) NEAR MENDOTA, FRESNO COUNTY, CALIFORNIA, MARCH 19, 1929. THERE WERE ALWAYS SOME OF THE BIRDS WITH THEIR HEADS UP WATCHING FOR DANGER. SLOWLY THEY CAME TOWARD THE BLIND, PICKING UP THE SCATTERED CORN USED AS BAIT.



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Figs. 3 and 4. OCCASIONALLY THE CRANES WOULD CALL IN DEEP, ROLLING TONES. ONE OF THE BIRDS STARTED TO CALL, THE BILL WAS HELD OPEN AND AT EACH CALL THE WINGS WERE DRAWN AGAINST THE SIDES, SEEMING TO HELP FORCE OUT THE SOUND.

knees under his chin and folding up like a jackknife. Very small apertures were cut through the blind in order to allow the use of the camera lens. Through these small openings we watched the birds. Mr. Cheney secured some 450 to 500 feet of excellent movies, from which the accompanying views have been selected. I sat in the other blind and watched the birds.

Slowly the cranes worked toward the blind, picking up the scattered corn used as bait. Closer and closer they came. From a point close to the ground, as one

looked up at them, they appeared much taller than they actually were. (See figs. 2 and 3.) Occasionally they would call, in deep, rolling tones. They seemed to sense that something was amiss with the particular sage-bush in which the blind was located. But after moving almost entirely around the clump, at sixty or seventy feet distance, and being unable to see anything wrong, they began to come closer. I was watching eight or nine Little Brown Cranes slowly stepping toward me as they picked up the corn, when suddenly there was a terrific ear-splitting noise, which seemed to be directly over me. I almost jumped, it was so loud and startling. That would have been disastrous. I slowly turned my head and peered out through a hole to find that the bird which seemed to be on top of me was fully 20 feet away. The sight was becoming more and more exciting, as these great, wary birds came closer and closer to the blind. There were about ninety birds within 30 feet of the blind and perhaps a dozen or fifteen within 12 feet. Slowly, I turned my head, and there, directly behind, was a crane only about 8 feet distant. (See fig. 4.)



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Fig. 5. THE OBSERVER WAS IMPRESSED WITH THE HIGH GRACEFUL STEPS OF THE CRANES.

Fig. 6. IN THE ACT OF REACHING FOR A SMALL PLANT.

In a few moments, one of the cranes started to call; the bill was held open and at each call the wings were drawn against the sides and seemed to help force the sound out. Immediately following the call, a rush of air could be heard, as though the bird was refilling its lungs. Their calls were so loud that after a few minutes, my ears started to ring from the reverberations, until I was unable to hear very well. I jotted down some of the calls as follows: *kr-r-r*, *kr-r-r*, a rasping, guttural, vibrating call given mainly on the ground, but not so very loud. The sound may be imitated by pronouncing the first syllable and vibrating the tongue gutturally, forming the *r*'s. A *cronk*, *kruk* was only occasionally heard, while a *kr-luck kruk*, was a low contented clucking note given mostly when the birds were feeding or standing idly about; a *whee-ee whee-ee* was often heard especially during a slight bickering between two birds. For some time, I did not realize that this thin peculiar call came from the cranes. A flock of six came wheeling in and parachuted down directly over me. Then came the tremendously powerful call for which the birds are noted, *kr-r-r*, *kr-r-r kr-r-uk*, *kr-r-r-oo*, *kr-r-r-r-oo kruk*. I could have reached out of the top of the blind and grasped the nearest one by the legs, it was so close above me.

The feet of the birds were used nearly as much as the bills in fighting. They would raise their feet, flap their wings and strike forward and downward apparently with considerable force; for when a blow landed the feathers would fly. While feeding, one bird would often reach out with its bill and grasp another by a part of the wing or back, or sometimes a dagger-like stab would suffice. They seemed quite pugnacious. I suppose the approach of the breeding season had something to do with it.

As the birds were walking about near the blind, one large bird spied some movement on my part and stood eyeing the aperture out of which I was peering for a minute or so. It would look with first one eye and then the other, turning its head at right angles to me each time. Every few moments, it would call softly, a questioning *kruk, krak*, and finally, after convincing itself that nothing was amiss, it went on feeding.



Fig. 7. A CRANE WOULD PREEN ITS FEATHERS, WHICH WERE IMMEDIATELY RUFFLED AGAIN BY THE STRONG WIND.

A small blue-bellied lizard preferred my sage-bush to any other and was determined to get on my back. I do not mind lizards, but in such close quarters and under such conditions, I can not say that I like to have them crawling on me. I finally chased it out and it headed for the next sage-bush about 80 feet away. It went too close to some cranes and one of them nabbed it and swallowed it almost before I could see what was happening. (See fig. 5.)

I was impressed by the high, graceful steps of the cranes. They stalked about with the precision of soldiers on guard. Occasionally, when one of the birds discovered some rich morsel, some of the others would trot toward it. When feeding on the roots of plants, a bird would secure a firm grip with the bill and start to pull, quivering all over as it strained. (See fig. 6.) Finally the plant would give way, but instantly the bird would resume its composure. There seemed to be no loss of balance as the plant came up.

Sometimes a bird would stand preening its feathers, which were immediately ruffled again by the strong wind which was blowing at the time. (See fig. 7.)

There was one bird which I suppose was a Sandhill Crane, for it was taller and larger, with a longer bill, than any of the other birds. When this bird approached, it was on the opposite side of the blind from which my gun was protruding. The blind was so small that in order to turn the gun around, I was forced to slide the muzzle in very carefully, take off the forepiece and the breech, draw the muzzle all the way in and push it through another aperture slowly and reassemble the gun. All of this took time, as everything had to be done slowly. By the time I got the gun turned around, the bird had moved and I kept up this shifting until the bird finally got on the dark side of the blind and stayed there so I could not see him. Finally, he moved off to a considerable distance and became mixed in among the rest of the flock. I was extremely worried for fear one of the birds would come and actually look into the blind, but I soon discovered that they did not come very close to any of the bushes in their movements about the field.



Fig. 8. THE CRANES GATHERED AND MOVED OFF TOWARD THE SOUTHEAST.

At 5:30 p. m., the prearranged time for me to collect my specimens, I opened fire at the biggest male bird that I could see and then dropped the female that had been with him as she leaped into the air. All was bedlam at the first report of the gun. Cranes bounded into the air on every side. The rush of wings and all the voices sounded as a roar. (See fig. 8.) The cranes gathered and moved off to the southeast. Some that were some distance away were slow in taking off, but at the first movement of the blind they were on their way. The larger part of the flock came down in a field some two miles farther south, only to take off again and disappear.

Mr. Cheney remained over the next day and he said the birds on coming back into the field did not come nearer than a quarter of a mile to the blind in which I had been located. They gave it a wide berth and continually watched it

from wherever they were located. This shows the extreme wariness with which these birds are endowed.

Apparently this species of crane does a major part of its courting and display antics before it departs for the north. The birds pass over the Sierra Nevada of Mariposa and Tuolumne counties on their way north, generally between the last week of March and the middle of April, and thence turn almost north across Nevada. On April 29, no cranes were seen or heard of in the San Joaquin Valley, so it was taken for granted they had all departed. The last that were seen by people living near Firebaugh was a flock of ten on April 20.

Division of Fish and Game, San Francisco, California, August 26, 1929.

IN MEMORIAM: CHARLES DEB. GREEN

WITH ONE ILLUSTRATION

By ALLAN BROOKS

The sudden death of Charles deBlois Green which occurred on August 12, 1929, at Penticton, British Columbia, has removed one more of the little band of sportsmen, naturalists and travelers of the last century, of whom the late Warburton Pike was probably the best known to the world at large.



Fig. 9. CHARLES DEBLOIS GREEN, 1863-1929.

Few men could have made such an impression on their friends as did Green. Added to the charm of a delightful personality, his ways were full of such originality and forcefulness that even his casual acquaintances were apt to remember him forever.

Born in 1863, the younger son of the late Rev. James Wastie Green, first Rector of March, Cambridgeshire, England, Green was educated in England and adopted the profession of land surveyor. Leaving England with his wife and infant daughter in 1888, his first experience in British Columbia was in the West Kootenay district. Some years later he came to Okanagan and established his home at the southern extremity of that valley, close to the northern end of Osoyoos Lake.

Here for many years he lived the life he loved. His profession took him into the mountains east and west, surveying the mining claims for the host of prospectors that in those days peopled that region. His employees were all soon to recognize that if any strange bird or butterfly came into view all work must cease for the time, and many a new bird did he identify through the lenses of his transit. At his home he was monarch of all he surveyed, eight miles from his nearest white neighbor, surrounded by a diversified country full of an extraordinary variety of bird and mammal life.

Cranes, geese and ducks nested in the river flats in front of his home, white-tailed deer waved their flags as he threaded through the willow brakes, Ruffed, Dusky and Sharp-tailed grouse were found in quantities on the benches and slopes that rose from the floor of the valley, while Mule Deer and Mountain Sheep were on the near-by hills.

A wonderful shot and a keen sportsman he then delighted in a heavy bag, yet he maintained a good stock of game by Old-World methods of conservation. Out of his own pocket he paid a bounty on the worst enemies of game to the Indians of the near-by reserve of In-ka-neep. For all coyotes brought in he paid a dollar each, for Horned Owls half a dollar, for skunks twenty-five cents, and for crows and magpies ten cents; these bounties together with his own work as a game-keeper in his spare time kept down the vermin, and while in some seasons his bag of grouse would run into the hundreds, in others he would not shoot at all if he considered that some cause, like a bad hatching season, had depleted his stock of game.

Through it all he took a keen interest in zoology and left an impress on it which warrants the record of the present memoir although he was not a member of the Cooper Club. At first his chief attention was given to Lepidoptera, of which he published the first list for the interior of British Columbia; later he commenced to collect birds' eggs. This became his absorbing hobby, and to ensure the identification of these as well as to establish new records he collected a few birds.

In 1910, Green made the first of many trips to the Queen Charlotte Islands and other islands of the northwestern coast. Later he lived for over a year at Massett, in the northern portion of this group. With Mr. Walter Burton and Warburton Pike in 1913 he undertook an adventurous voyage in a small sloop to that storm-beaten rock, Triangle Island, far out in the Pacific off the northern end of Vancouver Island, in the hopes of finding the nesting ground of the Marbled Murrelet.

In 1914, at the outbreak of the World War he found that being over age he could not get overseas as an enlisted man. While awaiting some other opportunity he undertook an expedition in April of the following year to Langara Island, the most northerly of the Queen Charlotte group. The voyage was made from Massett in a row-boat with one companion; the object to secure as many sets of eggs as possible of the Peale Falcon. Day after day around that rugged isle, exposed to the full strength of the huge Pacific swells, they cruised with their frail craft, making precarious landings wherever the presence of a pair of falcons betokened

a nest. In all, some sixteen sets and a number of birds were taken, the whole collection being disposed of for the benefit of the Red Cross Society.

Shortly after his return from this trip, Green joyfully accepted an enrollment with a Red Cross section giving voluntary service under the French command. Here he served at various sectors until the close of the war, gaining the Croix de Guerre for conspicuous service under fire.

Returning to British Columbia in 1919, he went into sheep farming, as he owned a large range of suitable land in the Keremeos district, but he did not give up his interest in the islands of the northwest coast. Twice he made trips to the islands south of the Alaskan boundary, with the nesting-riddle of the Marbled Murrelet as his principal quest. He practically solved this, although the final achievement was left to one of his friends to accomplish.

Of late years arthritis aggravated by years of exposure in his pursuits crippled him; but his indomitable spirit kept him going. Neither his family nor his friends knew that any other serious affection was troubling him. Only the day before his death he wrote to the writer that lame as he was he was going up to the timberline-zone to collect a bird that he had been unable to identify on a recent trip; and then came the news of his death.

Green added a number of species of birds to the British Columbia list, among them being the Cañon Wren, Sage Thrasher, White-throated Swift and Alexander Ptarmigan; also such northern breeding birds as Red-throated Loon and Semipalmated Plover were put by him on the breeding list of the Province. His published notes were few, mostly random jottings in "The Murrelet", the organ of the Pacific Northwest Bird and Mammal Society; but to his many friends the memory of his vivid and lovable personality will endure longer than anything he might have written.

Okanagan Landing, B. C., October 3, 1929.

THE FOSSIL BIRDS OF THE A. O. U. CHECK-LIST

By ALEXANDER WETMORE

Though written or pictured information regarding the living birds of America begins with the designs made by the Maya and other ancient peoples, and continues with Columbus' account of the nightingale of Haiti which sang by day and by night (unquestionably the mockingbird) and with other casual mention of birds in the accounts of the earlier voyagers, our knowledge of the bird life of the New World extends back into a far more remote antiquity, since we have in the geological strata records in the form of fossilized bones of birds that lived in the remote period of the Cretaceous, 60,000,000 or more years ago, when giant reptilian forms were the dominant types of life upon the earth, and when mammals were in their infancy. The official check-list of the American Ornithologists' Union in its three editions thus far published has listed these fossil species as an appendix, and it is planned to continue this practise in the fourth edition now going to press. The revised fossil list has been brought down to date, and to make it complete in addition to extinct species will include those living forms whose remains have been found in a fossil state.

At the Ottawa meeting of the Union in 1926, I made a preliminary statement regarding this fossil list, and my present remarks, now that the manuscript is complete, are in continuation of what was then said. To review briefly, the first edition of the A. O. U. Check-list in 1886 included 46 fossil species of birds, the second edition in 1895 listed 64 fossil forms, and the third in 1910 gave 72 in this category. The list at the moment of writing this covers 146 extinct forms with the addition of 102 species still living, a total of 248 forms now known from the fossil beds of North America within the Check-list limits. In addition, 10 species of fossils have been described whose status is uncertain, so that the total reaches to 258. There are obviously numerous additions still to be made; in fact it is anticipated that the list will be increased beyond the numbers here given before the volume in which it will appear is finally published.

The 258 forms now included in the fossil list are distributed among 20 orders (see table 1), three of these, the Hesperornithiformes, Ichthyornithiformes and Diatrymiformes being extinct groups, and the remaining seventeen having modern representatives. Of the orders of birds at present found in North America there are only four, the Caprimulgiformes or goatsuckers, the Micropodiiformes or swifts and hummingbirds, the Trogoniformes or trogons, and the Coraciiformes or kingfisherlike birds, of which at present no fossils are known within our limits. This indicates in part a remarkable stability in type in our ornithology, when the vast period of time concerned is considered, though it must be borne always in mind that the fossil record is incomplete and that unexpected species of peculiar form may come to hand at any time.

Hawklike birds are the most abundant among the fossils of our list in point of species, numbering 45 in all, of which 29 are extinct and 16 still living. Ducklike forms, with 39 known species, stand next, but here the proportion of extinct and living birds is reversed, there being only 11 of the former but 28 of the latter. Shorebirds, gulls and auks number 30, with 19 extinct and 11 living, and gallinaceous birds 25, of which 16 are extinct and 9 still living. The cranes and rails include 19 species, the pelicans, boobies and cormorants 15 species, and the owls 13 forms. Other orders are represented in less abundance. The list of perching birds, with only four fossils and seven living forms, is very small and will be considerably

extended since bones of passeriform birds to the present have been laid aside in the main without determination because of difficulties attendant on their identification.

TABLE I. THE NUMBER OF NORTH AMERICAN FOSSIL BIRDS KNOWN, BY ORDERS

	Total number known	Extinct	Living
Hesperornithiformes	6	6	0
Ichthyornithiformes	8	8	0
Gaviiformes	1	1	0
Colymbiformes	9	4	5
Procellariiformes	4	2	2
Pelecaniformes	15	13	2
Ciconiiformes	11	7	4
Anseriformes	39	11	28
Falconiformes	45	29	16
Galliformes	25	16	9
Gruiformes	19	15	4
Diatrymiformes	5	5	0
Charadriiformes	30	19	11
Columbiformes	3	1	2
Psittaciformes	1	1	0
Cuculiformes	1	0	1
Strigiformes	13	4	9
Piciformes	2	0	2
Passeriformes	11	4	7
Total		146	102
<i>Incertae sedis</i>	10	10	
Total	258	156	

The list is richest in forms of large size, as these have heavier, stronger bones which are more liable to preservation than those of smaller species which have more fragile skeletons; and also because of their size the larger forms are more readily found in the course of excavations. Water-loving species, and birds like hawks and owls that roost and nest on cliffs, are most abundant, since in such habitats there is greater opportunity for skeletons to be buried, preserved, and made fossil.

At the end of the list comes that sad category "*Incertae sedis*" containing those species that have been described by hasty or enthusiastic individuals without distinct idea as to their group relationships. These can only be arranged alphabetically and are in their present condition meaningless. Some of them may not be birds. They include such names as *Eopteryx mississippiensis* based on a broken bit of a vertebra from Eocene deposits near Jackson, Mississippi; *Laopteryx priscus* from the Jurassic beds of Como Bluff in southern Wyoming, at one time bravely put in the same family as the famous *Archaeopteryx* of the Solenhofen slates of Bavaria, but now considered to be very doubtfully a bird; *Laornis edwardsianus*, possibly a goose; and *Uintornis lucaris* at one time believed to be a woodpecker but now of doubtful status. There is also with them *Fontinalis pristina* described many years ago from the Florissant beds of Colorado as a fossil moss, the type specimen on later examination proving to be a bit of fossilized feather. All repose in a scrap basket where most of them will remain without hope of definite identification.

Such in hasty review is the present check-list of our fossil avifauna, the total representing merely a hint of the abundant life of the past in North America where, at the close of the Tertiary, climatic conditions were such that the great diversity at present found only within the tropics in all probability extended far to the north within our limits. Our knowledge of these matters increases annually, and succeeding

decades should enable us to sketch in more and more fully the outline of the wonderful and interesting bird-life of the past, a mosaic picture made from fragmentary bits of bones from birds long dead that with proper understanding becomes as vivid and living a reality as any of our ornithological experiences of today.

Smithsonian Institution, Washington, D. C., October 20, 1929.

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AMERICAN RAPTORES AND THE STUDY OF THEIR ECONOMIC STATUS

By W. L. MCATEE and HERBERT L. STODDARD

In a series of articles to which reference is given below¹ Major Allan Brooks criticizes the methods of study of hawks and owls that have been used in obtaining the results published by the Biological Survey. In effect this is propaganda against the entire group of hawks and owls, for it tends to weaken faith in the great bulk of what substantial evidence there is regarding the economic value of American Raptors. Undeniably there is profound public prejudice against these birds, and prejudice looks not to details of evidence against it, while accepting indiscriminately anything that confirms it. For this reason every one of the articles cited is a blow leading up to the finishing coup that seems not far off for the birds in question.

Major Brooks says that hawks are one of his chief interests in life and adds that he would not live in a country where he could not see hawks and eagles every day. Yet in the view of a number of fellow ornithologists, he is a most active propagandist against predatory birds and is doing much to hasten the time when these interesting forms will be only a memory.

These remarks are not begging the question, as we would not attempt to stifle constructive criticism of the methods that have been employed in the studies of our predatory birds. The fact is, however, that Major Brooks' articles contain various statements not supported by the facts and censure methods of stomach and pellet analysis and the results derived therefrom in a largely unwarranted way.

Taking up some of these points in order, we note the statement that "We know it [the Marsh Hawk] to be the prime factor in the near-extirpation of one of our finest game birds—the Heath Hen." It may well be asked who knows that? and how? Gross does not say so in his monograph, "The Heath Hen", nor does Forbush in his "Birds of Massachusetts". No, the statement is simply a lamentably loose one which comes as manna to gunners who are fanatical about birds of prey, but which is so surprising from an ornithologist of standing.

In this same article on the Marsh Hawk is quoted the following statement that is a good example of the lack of accuracy in natural history observations. "Mr. Harry Ferguson of New York tells me that out of some score of Marsh Hawks sent to the Biological Survey from his estate on Fisher's Island the great majority were stuffed with Pheasants." The truth: 249 Marsh Hawks from Fisher's Island were examined and 34 (less than one-eighth instead of a majority) of them had eaten pheasants.

"In all our ornithological journals", says Major Brooks, "there is a continuous and united plaint to save our hawks and owls; nothing else counts. The duck disease that is ravaging the waterfowl resorts of our arid west, the crude-oil menace which is daily killing thousands of sea birds, the increase in our large gulls which threatens the very existence of our most interesting sea birds, the alarming decrease of many of our eastern small birds, the pollution of our streams and the diminution of our marshes, all these mean nothing in comparison with the passing of useless or never-enforced laws to protect birds that are better able to protect themselves than any other class of birds living." This quotation can only be classed as a tirade. The

¹ Should we protect the Marsh Hawk? *American Game*, 17, no. 6, Oct.-Nov., 1928, pp. 88 and 91. The Marsh Hawk—"Something Wrong Somewhere", *American Game*, June-July, 1929, p. 67.

Pellets of Hawks and Owls are Misleading, *Canadian Field-Naturalist*, 43, no. 7, Oct., 1929, pp. 160-161.

On Pellets of Hawks and Owls, *Condor*, 31, Sept., 1929, pp. 222-223.

phrases "nothing else counts" and "all these mean nothing" are simply untrue and the implications of the paragraph throughout are heedlessly distorted. The duck disease of the west has been an object of research for many years; federal and state investigations have been in active progress in the present and other recent seasons, and the subject is one of the liveliest in the realm of conservation. Oil pollution has received national and international consideration, but regardless of the gravity of the situation, it is not true that this type of pollution "is daily killing thousands of sea birds." "The alarming decrease of many of our eastern small birds" is very debatable; many think and with reason that small birds have never been so abundant in the east as now. Indeed they could have had nothing like their present abundance in the original densely forested condition of the country. Finally can any recent instances whatever be cited of the passing of laws to protect Raptores? The implication is that constant propaganda has resulted in frequent passage of such laws, but such is not the case. Reference to laws to protect birds of prey as "useless and never-enforced" it would seem should be accompanied by a realization of the almost hopeless position these birds have in public opinion. There is no prejudice stronger, save that about snakes, than the universal hatred of hawks and owls. Major Brooks according to his own statements should be the last to fan the flame.

References to the methods employed in the study of the food of hawks and owls are still more sweeping and reckless. The following are examples: "The value of pellets as a record of a raptor's diet is nil." That pellet study "is an entirely untrustworthy method of analysis anyone who has kept a hawk or owl in captivity and studied their feeding habits and reactions must know."

"The fact is that only where fur or other absolutely indigestible matter is swallowed is any pellet thrown up. Feed a hawk or owl a bird that it can pick or strip the skin from and no pellet results. So that only where bird-remains are involved in mammal fur in the captor's stomach is there as a rule any evidence of birds being eaten from pelletal examination.

"In other words, a raptor might be feeding almost entirely on poultry or game birds. Yet its pellets would only show evidence of this if it had eaten a mammal at the same time, while every mammal would surely yield the evidence in a pellet."

The foregoing statements fail to take into consideration the bones. These are indigestible and certainly identifiable. In how great a proportion of cases does a bird of prey kill something so large that it will not swallow some pieces containing bone? The point would seem to be largely settled by the probabilities of the situation. The size of the prey must usually be less than that of the predator so will not furnish any great amount of meat free from bones. On the other hand it is a habit with various raptors to bite or pull off the heads or feet of victims and swallow them first; positive identifications can always be made of these parts.

The thoroughness with which Raptores pluck their prey usually is overdrawn. Short feathers such as those along the edge of the wing are hard to pluck. Even some of the feathers plucked tend to adhere to the bill and to be swallowed with later mouthfuls. They have been observed in the field even to be swallowed in balls by themselves. The feeding of Raptores on clear meat without the taking of any feathers, hair, or bones certainly is the exception rather than the rule; and if any trace of body covering or skeleton is present it gives a clue sufficient in many cases even for close identification.

References to the Marsh Hawk studies carried on near Thomasville, Georgia, during the Cooperative Quail Investigation indicate lack of familiarity of our author

with the methods used, and with the results secured by this Investigation. For instance, in the article entitled "Should We Protect the Marsh Hawk?" is the following: "The foregoing article was returned to me by the editor of one of our prominent bird magazines as being likely to prejudice the public against really beneficial hawks. A comment made was that the investigations of Stoddard in Georgia, on pellets thrown up by Marsh Hawks, disclosed the fact that this hawk did not kill quail to any extent but lived almost exclusively on rodents (cotton rats).

"Anyone who has kept hawks in captivity should know that pellets are no criterion of a raptor's food, only fur or feathers that cannot be plucked make pellets; birds are carefully plucked and no recognizable remains can be found in the pellets as a rule. But every meal from a mammal is followed by the ejection of a pellet." Allusion is made to this study again in the same vein in the June-July, 1929, issue of the same magazine as follows: "The investigator chosen to work on the Bob-white situation in Georgia exonerated that deadly Quail-killer, the Marsh Hawk, *solely* (italics ours) on the evidence of one thousand or so pellets picked up at the hawks' roosting places."

Now the work on the marsh hawk in Georgia was neither superficial nor slipshod, and the word "solely" in the above article gives an entirely erroneous impression, for field observations were depended upon *mainly* in determining the status of hawks present in their relation to quail: the very method that our author apparently favors. Two men were almost constantly afield on typical southeastern quail ground the first four years of the study, ever on the alert for evidences of the quail-predator relationships. The "Report on the Cooperative Quail Investigation: 1925-1926", pp. 37-40, makes preliminary mention of the study of the relation of the marsh hawk to quail on the preserves of the Southeast. The final report of the Investigation, now nearing completion, will contain a complete list of all the birds, mammals, reptiles, and insects identified in one lot of 1098 pellets collected during the winter of 1925-26 and in another lot of 177 collected in the same area in February, 1927. The pellets used in this study were collected from roosting spots on one of the most heavily stocked quail preserves in the Thomasville-Tallahassee region. The spots were carefully cleaned in advance and additional pellets from the one to two dozen hawks present were picked up every few days, so that only fresh pellets of approximately known date were used. This was easy, as the hawks used the same spots night after night, going to roost just at dusk.

While the complete list of creatures eaten must await the full report, it may be of interest to note that 36 species of birds were identified as well as 9 species of mammals in the first lot of 1098 pellets. In 138 instances bird remains alone were recognized in these pellets. Song sparrows occurred most frequently among the birds with 64 occurrences, and cotton rats most frequently among the mammals, for one or more were found in 925 of the pellets. Duck remains were noted in 9 cases and coots in 2; but the presence of these larger birds was not surprising, for waterfowl shooting was heavy on near-by lakes where ducks crippled, or killed and not retrieved, were numerous. The whole pellet study checked closely with what would be expected from field observations, and from stomach examinations previously made by the Biological Survey.

As a further check on this work and to see whether the pellets were a reliable index to the general diet, an adult marsh hawk was trapped and confined in a clean-bottomed cage for a month. Cotton rats, house rats and mice, blue jays, English sparrows, dead bob-whites, and other animals, were fed, and the feeding of the hawk watched from concealment, the resulting pellets being gathered daily.

While birds were picked in part and mammals sometimes partly skinned, the work was not clean and in all cases liberal amounts of feathers, fur, bones, and other pellet-forming materials were swallowed. Feeding was so regulated that either birds or mammals, or both together, were fed after starving the bird a day or two, so that the time required to form the pellets, and the characteristic types of pellets with different foods, could be ascertained. It was noted that mammal pellets were as a rule somewhat larger and less fragile than those composed entirely of bird remains, a fact that was considered in this food study, and one that should always be taken into consideration.

The fact that so many forms of life were *specifically* identified and so many pellets *with bird remains only* were noted, together with the experiments made, make us believe that this study gives a reasonably accurate picture of the relation of the marsh hawk to other wild life in this representative part of the Southeast during the only season of the year it is present, the winter months.

The raptorial birds have been favorites of one of the present writers (Stoddard) since boyhood, in the field rather than in the laboratory, and he believes that the pellets ejected by several species of the smaller owls, as well as by the marsh hawk and probably the duck hawk, will prove to be of very great value in all studies of their food habits that may be undertaken. Those of the Cooper, sharp-shinned, broad-winged, red-tail, red-shouldered and perhaps others are as a rule scattered and much less available for such studies. It is obvious that pellets from an *uncertain* source should *never* be depended upon.

Observations made on the feeding habits of the snowy owl and bald eagle do not necessarily furnish a clue as to the value of pellet records of other species, and each species should be studied and judged separately, as is the practice in the Biological Survey. The skilled economic ornithologist ordinarily takes all such matters into consideration when making a study of the economic position of any species. It would be a revelation to the uninitiated to see the technique employed in identifying the bits of fur, feather, bone, etc., found in pellets examined in the Division of Food Habits Research of the Biological Survey, or to go over the tremendously extensive reference collections used for comparison in these researches.

That "the examination of the food of raptors in America has been left almost entirely to the activities of laboratory experts" is another unfounded statement, as the individual who has studied the food of hawks and owls more than anyone else certainly has had a life-long and varied field experience, and all so-called "laboratory experts" of the Biological Survey have frequent assignments of field work. In fact the policy of the Survey is to have a man do both field and laboratory work so far as possible on every problem he investigates.

Major Brooks notes that "every hawk that I ever collect carries on its label a record of its stomach contents." He seems to think these examinations of some value, but he should realize they are crude compared to what can be accomplished in the laboratory. Field observers may report as unrepresented an item of food that they believe they have actually seen the bird take, while a laboratory worker by washing, decanting, filtering, and settling processes may bring to light an odd feather or bit of bone that may tell the story.

Experience from the beginning in the Biological Survey has pointed almost invariably to the greater reliability of stomach examination as compared with field observations. How many, many, times there have been received the stomachs of birds reported as feeding on this or that specific item, cherries, corn, ants, or what not, only to have them fail to yield any trace whatever of it. Are we to have

the argument of inadequacy of stomach examination invoked in all these cases? To do so would be ridiculous, but scarcely more so than the attempt to make out that the birds of prey constitute a special case that can not be studied by the usual methods. If the methods are good for ordinary birds, and this has never been challenged, they must be good for the highly insectivorous burrowing and screech owls and for the sparrow hawk. If good for these, why not also for the species which while insectivorous to a considerable degree are more inclined to vertebrate subsistence, such as the Swainson, broad-winged, and red-shouldered hawks; and if for these why not for the typical bird and mammal eaters? Where can a line be drawn in so graduated a series that will separate species that can be adequately studied by a certain method from those that can not? The impracticability of drawing such a line is proof in itself that the allegation of inadequate methods is unfounded. The whole basis of economic ornithology in this country is the method attacked, one that is just as valid for predatory as for other birds. Condemning it can have no other result than undermining the structure of bird protection, and this structure up to the present has been particularly weak as concerns hawks and owls. They have had practically no protection.

Major Brooks says "My whole effort is to try and protect our beneficial hawks and finer raptures . . . yet I am assailed on all sides as a hawk hater." We agree that he does have the reputation of being a hawk hater, even though it seems incompatible with his frequent use of these birds as subjects for some of the most striking and beautiful of his paintings. We may suggest, in view of his published utterances, some of which are reviewed here, that he should not be surprised at the reputation to which he refers. In a field where half truths are so prevalent, and his articles as we have shown are not free from them, and where they are ordinarily accepted as the whole truth, it is but adding fuel to the flame to attempt niceties of argument. Not enough is known of the subject by anyone to make this type of debate profitable, and while the quibbling goes on the Raptures are being steadily exterminated. They are becoming rare enough throughout most of the United States already to need the special treatment we should have available when required for the protection of any species of wild life actually threatend with extermination. Regrettably, it is probable that before we have attained that evidence of civilization, the hawks and owls will be too far gone to profit by it.

United States Biological Survey, Washington, D. C., November 13, 1929.

THE BREEDING BIRDS OF CENTRAL LOWER CALIFORNIA

WITH ELEVEN ILLUSTRATIONS

By GRIFFING BANCROFT

A Contribution from the San Diego Society of Natural History

By wagon road and burro trail it is an even one hundred miles from Santa Rosalia, on the Gulf of California, to the tide line of the Pacific at San Ignacio Lagoon. The intervening country is essentially a desert. The summit, which is two thousand feet high in the passes and nearly three times that altitude in the mountains, lies within ten or twelve miles of the Gulf. The two watersheds are thus of unequal length. They are also of quite distinct configuration. On the eastern side the descent to sea-level is abrupt and precipitous, checked by two rather extensive valleys. The long western slope, on the other hand, is broken by valleys, cañons, and pretentious hills. It is marked with the weird formations which are characteristic of arid North America and which are here exaggerated. Angles and profiles of silhouetted hills and table-tops are unusually harsh and forbidding. There is not even the softening effect of grandeur.

Over the major portion of the entire region lava has flowed and mesa, valley and mountains are covered with dull brown rocks. This lava sheet, though of varying thickness, normally does not exceed three feet in depth. In overlaying the ancient sandstone it parallels the slopes of the hills and the sides of the cañons, while on the mesas, and sometimes in the valleys too, it is as level as they and often stretches away as far as the eye can see. The lava covering, in the process of cooling, has broken into fragments that rarely exceed a cubic yard in size. The edges are sharp and the lines of cleavage easily traceable. Indeed, so slightly has the deposit weathered, it seems as though but yesterday it solidified and cracked.

The lava surface is not present everywhere, but it does cover four-fifths of the area we examined. Where it is absent it presumably either has been removed by water or covered with ashes or sand. An exception is the western margin of the cross section where the ocean and lagoon bottoms have changed position in recent geological times. These are either smooth and salt-crusted or else they have been worked into sand dunes.

There are several systems of dry river beds which have an important influence on the biology of this region. Even though the country be arid beyond anything known in the United States there still is enough rainfall to provide some moisture. This water, as well as a part of that from the cloud-bursts that come once in a decade, finds its way to the sea by means of a subterranean flow. The conspicuously marked stream courses and the accompanying level valley floods are outstanding features of the landscape. The alluvial deposits are usually river sand, but they also include extensive beds of cobble stones or of relatively fertile silt.

Occasionally the subterranean flow encounters bed rock formations which force the water to the surface. On the Gulf side, three miles west of Santa Agueda, there is an oasis which supplies water for Santa Rosalia and its suburbs as well as for numerous truck gardens. On the Pacific watershed, where the drainage lines are longer, we found natural surface water at San Joaquin, the Alamo, and in José María Cañon. Outstandingly the most extensive of the oases is San Ignacio, where a town of a thousand people is supported. The settlement contains truck gardens and orchards in addition to a jungle of date and fan palms.

Climatically the two watersheds of the peninsula differ decidedly. The western slope is tempered by its exposure to the trade winds blowing from the ocean, while on the other side the shelter of the hills often produces a veritable inferno. Notwithstanding this the flora is quite homogeneous as is also the fauna, with a few rather remarkable exceptions.

The most conspicuous of the native growths is the giant cactus (*Pachycereus calvus*) known also as sahuaro or cardón. Wherever environments are not too hostile there are to be found these immense plants, which often attain a height of forty or fifty feet. In favored locations, though spaced irregularly, their arrangement is not unlike that of trees in an orchard. They dot the landscape of the lava fields wherever they can find a toe hold, and they take remarkable advantage of seemingly hopeless spots in which to live.

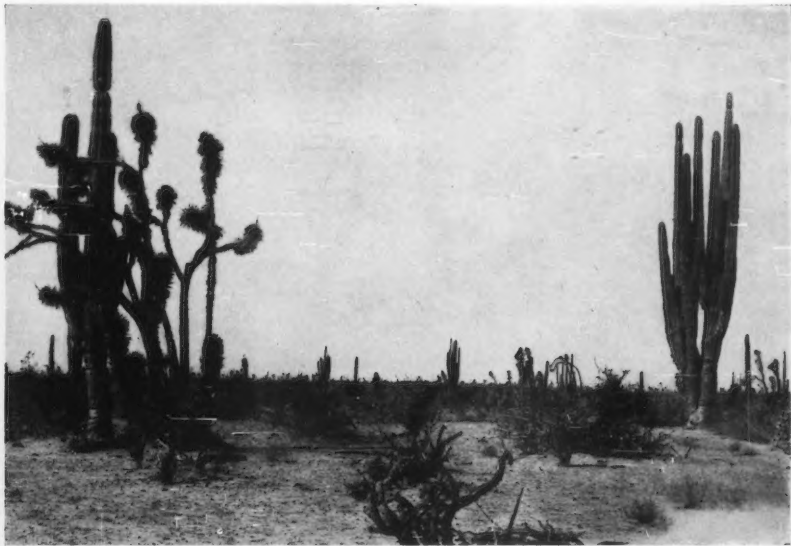


Fig. 10. THE DESERT EASTWARD FROM SAN IGNACIO; SHOWS A VALLEY IN WHICH CACTUSES OF SEVERAL KINDS PREDOMINATE IN THE VEGETATION.

The most abundant of the cactuses are the *Opuntia*, more commonly known as cholla. There are many species represented, and their distribution seems quite uninfluenced by geography. Like the cardón they have a sporadic growth in the lava fields and one that is quite heavy where there is a bit more soil. Theirs is a hard struggle for existence, as is shown by absence of the thick clusters to which we are accustomed on our side of the line.

The tree yucca (*Yucca valida*), often called the Joshua tree, is abundant locally on the higher elevations of the Pacific side. It shows a marked preference for the more fertile plains, leaving to the copalquin or elephant tree (*Pachycormus discolor*) the more stony portions of the highlands. The latter was barely beginning to bloom June 15, 1928, and there is a speculative possibility that when it comes into full

flower it may attract new birds to this region. There is an irregular growth of sage and other brush, occasionally heavy, but for the greater part sparsely scattered over the valleys and even the lava fields. Of lesser growths there is a multitude. They are of little interest to ornithology, however, except as sources of food supply for birds.

The most important riparian plant is the mesquite (*Prosopis glandulosa*). Decidedly more than three-fourths of the trees lining the stream beds are of this species. It spreads over the valley floors and maintains itself in shrub form in many less propitious spots. Palo verde (*Cercidium torreyanum*) rivals the mesquite in stature, though incomparably less abundant. It is not able to endure such hardships as is the other. The palo blanco (*Lysiloma candida*) is largely confined to the cañons emptying into the gulf. The thick and thorny arrow tree (*Sebastiania bilocularis*) is rather rare and limited to alluvial associations, but it is of great importance ornithologically because of being so eagerly sought for nesting sites.

During March, April and May and the first half of June of 1928, an ornithological survey was made, from salt water to salt water, of a strip across the peninsula. Starting with Santa Rosalia and its suburbs we followed the stage road to San Ignacio and then packed with a burro train through San Joaquin, the Alamo, and José María Cañon to the southern edge of San Ignacio Lagoon.

The party included, besides the writer, Mrs. Bancroft, Mr. J. Elton Green of Berkeley, and, until the end of April, Mr. Nelson K. Carpenter of San Diego. We are glad to acknowledge generous assistance from Dr. Clinton G. Abbott of the San Diego Society of Natural History and of Mr. A. J. van Rossem, who identified all the skins we brought home. We are indebted to every American and Mexican official with whom we came in contact for the uniform sympathy and courtesy which made our work possible. Especially do we owe recognition to M. Auguste Nopper and other officials of the *Companie du Boleo* for hospitality in Santa Rosalia, and to General Abelardo Rodríguez, the progressive, road-building Governor of Lower California, for official aid in the pursuit of our studies.

In compiling these notes I have endeavored to include all the birds giving reasonable evidence of breeding within the limits of the selected zone. The Raptores present problems of such general nature that they had better be discussed in a separate paper. They are listed merely to keep the record complete. A few aquatic transients remained as late as June 13. Experience elsewhere indicates that they are non-breeders; still it seems safer to mention them, especially the dowitcher. At that date a small flock of Lesser Scaup Ducks (*Marila affinis*) and some Ruddies (*Erismatura jamaicensis*) were on the fresh-water ponds of San Ignacio, and a pair each of Hudsonian Curlew (*Phaeopus hudsonicus*) and long-billed Dowitcher (*Limnodromus griseus scolopaceus*) were shot in San Lucas Lagoon. The sex organs of the female of the latter were the only ones to show signs of development.

By mentioning every bird which seems to be a probable breeder, omissions become almost as interesting as records. It does not seem likely, considering the length of time devoted to this search and the thoroughness with which the work was done, that any bird not on our list breeds here. The absence of many genera resident close to this cross section, either to the north or eighty miles away across the gulf, was one of the surprises of the expedition.

To avoid confusion I have followed exactly the scientific nomenclature adopted by Dr. J. Grinnell in his "Distributional Summation of the Ornithology of Lower California" (Univ. Calif. Publ. Zool., vol. 32, 1928, 300 pp., 24 figs.). All the measurements are from eggs in my collection.

Colymbus dominicus brachypterus. Short-winged Santo Domingo Grebe. This little grebe breeds sparingly in the fresh-water tule-bordered lagoons of Santa Agueda and San Ignacio. In marked contrast to the habits of the eastern representatives of this race as described by Bent (Bull. 107, U. S. Nat. Mus., 1919, p. 36) we found a preference for the hearts of tule patches as nesting sites. Of the few nests that were in the open none were in clear water; they were carefully blended into a thick mass that gave them protective coloration. The nest itself is a floating mass of decaying vegetable matter. The submerged portion, some six inches thick by a foot and a half to two feet in length, barely suffices to keep the cup out of water. The rim of the egg cavity is banked with loose materials. These the sitting bird pulls over her eggs whenever she leaves. Whether she moves off leisurely or is flushed, a few quick pecks hide every vestige of shell.

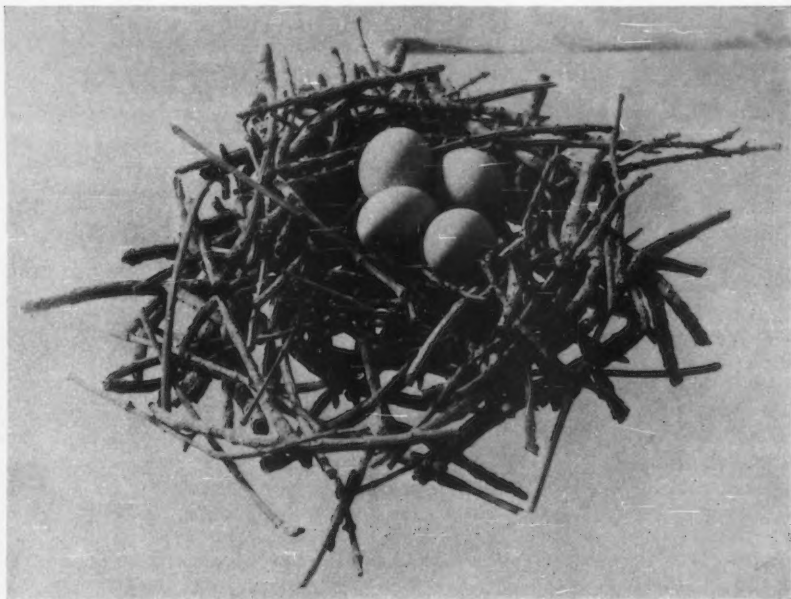


Fig. 11. NEST AND EGGS OF FRAZAR GREEN HERON COLLECTED IN THE LAGOON AT SAN LUCAS, JUNE 12, 1928.

The breeding season is long; fresh eggs are to be found at least from March until late in May. We took but one set, four eggs which averaged 31.9×23.0 mm. The downy young of the Mexican Grebe is the most precocious of the genus. It can dive and swim under water from the hour it is hatched. From the outset it hides by floating so nearly submerged that only the bill shows above the surface.

Podilymbus podiceps podiceps. Northern Pied-billed Grebe. The reservoir at San Ignacio is a body of water half a mile long and several hundred feet across. The greater portion of its shore is lined with a heavy growth of tules. Well within the densest stands some half dozen pairs of these grebes make their homes. Their breeding season begins early in April and extends through June. The birds

lay, quite consistently, four, five, or six eggs. This small average size of clutches is the most noticeable distinction between the habits of the birds of San Ignacio and those of central California.

15 eggs from San Ignacio average 43.8 x 31.7 mm.
69 eggs from California average 44.5 x 30.0.

These figures, from the meagerness of the data, do not necessarily indicate differences in size or shape. The eggs in both series, however, are consistently and materially larger than are those from the eastern United States.

Ixyobrychus exilis hesperis. Western Least Bittern. These bitterns were found in the reservoir at San Ignacio. It is quite difficult to estimate their number, for they were shy and could be seen only with difficulty. Mr. Green, who worked in the tules more than I did, estimated their number at twenty-five pairs.

The one nest we found contained, May 17, five eggs in such an advanced stage of incubation that they could not be saved. The nest itself was little more than a bundle of tules placed almost on the water and supported by dead matter floating there.

Butorides virescens frazari. Frazar Green Heron. We examined six nests, old and new, in San Lucas Lagoon. There was striking uniformity both in construction and in the sites selected. The crude platforms were small, even for a Green Heron. The nests were made entirely from dead mangrove twigs which seldom exceeded eight inches in length or a quarter of an inch in diameter. They were placed on crossed horizontal branches just below the canopy of leaves. Thus they were about four feet above the water at high tide. They were set five feet into the tangle, barely far enough to render them invisible from the water side.

The breeding season is at its height in early June. On the 7th and 12th of that month we found eight eggs, two clutches of two and one of four. The following comparative measurements are consistent.

Average of 7 eggs of the Frazar Green Heron, 36.0 x 27.6 mm.
Average of 39 eggs of the Eastern Green Heron, 37.7 x 28.4.
Average of 36 eggs of the Anthony Green Heron, 38.5 x 29.7.

B. v. frazari is apparently also resident in the fresh water of San Ignacio. We took an adult there in May, and Mr. Green found birds on the reservoir in the spring of 1927.

Porzana carolina. Sora Rail. We did not have the good fortune to find proof of the breeding of this small rail, though we saw or heard it continuously in the fresh water ponds of San Ignacio.

Fulica americana americana. North American Coot. A flock of approximately a dozen pairs nests in the reservoir at San Ignacio, and there are stragglers in the adjacent ponds. The birds begin to lay in May, but it is not until June that breeding reaches its height. The clutches are small. Those we found ranged from five to eight eggs.

The coots of San Ignacio build typical nests of dead tule stalks, but they conceal their homes much more carefully than do the more northerly breeders. They work their way into the denser tule growths and lay where they are entirely hidden from outside observation. One pair, however, instead of making a floating nest placed its structure four feet above the water where it was supported by living stalks that had been bent downwards.

Oxyechus vociferus vociferus. Northern Killdeer. One pair of birds was found near Santa Rosalía and two heavily incubated sets of eggs, a four and a three, were taken at San Ignacio on April 13 and May 4 respectively. There was a brood of chicks, ten days old, at Alamo on May 21. The local breeding habits present nothing novel.

Pagolla wilsonia beldingi. Belding Wilson Plover. There is a narrow peninsula, two or three miles in length, which separates San Lucas Lagoon from the gulf. The greater part of the surface is covered with cobble-stones, though there are occasional areas white with clam shells. Ten or twelve pairs of Belding Plover breed there. I sought their nests as I would have done those of the Snowy Plover, on shell-covered ridges where there would be both protective coloration and lookout points for the birds. I found fifty old nests—the accumulation of years—but not where I expected them to be. They were among the dark boulders and they were conspicuous because of their white shell linings. Some were on ridges and some in hollows, the strong preference of the bird being to place them between three cobble-stones so that, when sitting, it would be advantageously hidden. The nests were about eight inches across and perhaps half as deep. The parents had clearly removed pebbles, excavated cups, and brought in shells for a lining.

On June 14, the only day I hunted them, none of these nests contained eggs. We found a ten day old chick and from it and other evidence concluded that the breeding season here is early May.

Lophortyx californica achrustera. San Lucas California Quail. There is no considerable gap in the cross section where these quail were not observed. They insist on riparian associations, but they follow these without regard either to altitude or to the character of the country adjoining the stream beds. They definitely do not require the presence of water.

They were fairly abundant in José María Cañon and near the other oases they were not rare; and yet, though spreading from the sand dunes to the edge of the gulf, the total number of birds is comparatively small. The flocks seldom exceed a dozen pairs and even those are generously spaced within their habitat.

Our experience with the breeding of these quail was limited to San Ignacio. That was because the nests were too well hidden to be found, except accidentally, and those we saw were shown to us by the natives. Three of the sites were in damp ground in rank grass; one of them, to our surprise, on a tiny islet in a swamp. Two nests were in vineyards, two in natural cavities among the sucker growths of date palms, and one was under a lava rock on the mesa. In all but the last three cases the birds had excavated a cup nearly as deep as it was broad and had lined it with materials brought in, grass, leaves, and feathers. The breeding season commences about the first of June and is hardly well under way until after the middle of that month. The number of eggs in a clutch is rather consistently ten or eleven, sixteen being the most we found in any one nest. The following table is undetermined as far as the two northerly subspecies are concerned but it does show that *achrustera* consistently lays the largest eggs of the three races.

San Lucas Quail,	80 eggs average 32.3 x 24.7 mm.
San Quintin Quail,	150 eggs average 30.6 x 23.3.
Valley Quail,	144 eggs average 30.2 x 24.1.

Zenaidura macroura marginella. Western Mourning Dove. We found no nests of this dove, and yet there is much evidence to indicate that it breeds in this locality. As late as May 21, in José María Cañon, I observed a pair engaged in courtship. The species was distributed, away from habitations, wherever there was water. As a consequence it was most plentiful west of San Joaquin and in the

upper parts of Santa Agueda Cañon. It is not a common bird anywhere and seems to maintain a precarious foot-hold in these desert regions.

Melopelia asiatica mearnsi. Western White-winged Dove. Very evenly distributed across the peninsula. We found nests in the mangroves of San Lucas, in the sahuaro and tree yucca associations of the desert, among the palms of San Ignacio and near the water holes in José María Cañon. The sight of a White-winged Dove perched atop of a great cardón became too familiar to cause comment.

These doves breed wherever found and do not, in my opinion, wander far from their nests. These are well concealed by being set within the heart of thick vegetation. The larger trees are favored on the deserts, inter-laced leaves in the palm jungles, and brush or heavy weeds in riparian associations. A typical nest is built of rather long grass stems twisted to form a small disc. Laying begins early in April and continues at least to the middle of June. Forty-five eggs from this region average 30.0×22.5 mm.

Chamaepelia passerina pallescens. Mexican Ground Dove. The presence of water seems to be the determining factor in the distribution of this little dove. It is common wherever there are irrigation ditches or pools or available water in any form. As a consequence its occurrence is locally concentrated. It is abundant in the cultivated regions about Santa Rosalía and San Ignacio. At intervals west of the latter village and of San Joaquin, ten miles to the south, there are springs, both natural and artificial. Farming is not practiced at all in the more westerly section and so the abundance of the birds there, away from civilization, shows that the requisite for its presence is water rather than special food supply.

José María Cañon is about forty miles southwest of San Ignacio. Underground water has resulted in a substantial growth of the usual riparian vegetation of the region, mesquite along the borders, flanked by palo verde and heavy brush, with rank weeds over much of the bottom. Here the men who handle packtrains have opened holes to obtain water for their animals. Constant evaporation results, in time, in these tanks becoming increasingly impregnated with salt and alkali. The solutions eventually reach such strength that not even thirsty burros can drink them. New holes are therefore scraped out from time to time and the process repeated. It is interesting to note that the water unfit for these animals is generously used by the ground doves. So much so, indeed, that they are more plentiful here than in any other part of the cross section.

The birds breed near open water. They carry their demand for its proximity so far that, assuming my notes to represent a fair average, four-fifths of their nests are within fifty feet of a place to drink. I was surprised when this fact began to develop and I found myself looking about for water whenever I flushed one of the doves from eggs or young. Seldom, indeed, was it not close at hand. There is a marked contrast here with the birds of southern Sonora. There they abound on the open mesas and breed freely twenty to fifty miles or more from water.

The Mexican Ground Dove is an unobtrusive little fellow, blending his coloration into his background on every occasion, and carrying his reticence into his choice of nesting sites. He certainly does like concealment for his home, far more so than the birds of the opposite mainland. Trestled grapes are plentiful in this part of Lower California. Commonly a beam of palm wood three or four inches wide is supported on uprights at a height of five feet and a vine is trained to grow over this structure. The favorite nesting site of the dove is on the flat surface of the beam. The bird is snuggled in among the leaves, ideally protected and hidden.

Another popular haunt is in the palm jungles. At heights of from four to ten feet and on the stems of the vertical leaves of the date palms numbers of these birds build. They seek the shadows that come from heavy vegetation or crossed leaves. Most of the fan palms have been trimmed, their leaves being cut largely for roofing material. The stubs left are generally about a foot long, smooth and well cupped. Here, hidden from below and concealed from the sides, many of these doves raise their young. The preferred height is twelve to fifteen feet above the ground.

This dove is tame, flushes at close range, and plays cripple most artistically. The laying season begins the middle of April. The nests are the most substantial of any of the local Columbidae and often attain a thickness of an inch or more. They are built of comparatively long and fine materials, palm fibre and grass stalks being the favorites. They are well matted and the strands are twisted spirally to form a flat disc to which is added somewhat finer material in the center. Fifty-four eggs collected from Santa Agueda to San Joaquin average 21.9 x 16.3 mm.

Cathartes aura septentrionalis. Northern Turkey Vulture. Abundant throughout the cross section, especially on the eastern coast.

Parabuteo unicinctus harrisi. Harris One-banded Hawk. Common from San Ignacio to Santa Rosalía.

Buteo borealis calurus. Western Red-tailed Hawk. Fairly common from José María Cañon to Santa Rosalía.

Buteo abbreviatus. Zone-tailed Hawk. One seen near Santa Rosalía in April and one at San Ignacio in March.

Falco mexicanus. Prairie Falcon. Rare near Santa Rosalía.

Falco peregrinus anatum. American Duck Hawk. Rare at San Ignacio.

Falco sparverius peninsularis. San Lucas Sparrow Hawk. Quite common, breeding in the cardón, from Santa Rosalía to José María Cañon.

Polyborus cheriway auduboni. Audubon Caracara. Quite common on both coasts and not rare in the interior.

Tyto alba pratincola. American Barn Owl. Found only in the Mission San Ignacio.

Otus asio xantusi. Xantus Screech Owl. Not rare from San Ignacio, breeding, to José María Cañon.

Bubo virginianus elachistus. Dwarf Horned Owl. One seen near Santa Rosalía. One adult shot at San Ignacio, and five, presumably a family, observed in one day in José María Cañon.

Geococcyx californianus. California Road-runner. Rare but of peninsula-wide distribution. My census shows two near Santa Rosalía, three in the vicinity of San Ignacio, and one at the mouth of José María Cañon. They are wild and shy beyond understanding, taking alarm at a distance of a furlong or more and disappearing permanently into the brush.

I found two sets of eggs, hardly enough to establish breeding habits, but still indicative. Both were complete with two eggs. One was taken May 14, in the heart of a date palm. The nest was seven feet above the ground and so well concealed that it could not be seen until much of the foliage had been cut away. The other set was completed June 5. This nest was built at a height of six feet in a thick bush-like mesquite in a dry river bottom. Both were bulky affairs, two feet

across by eight inches deep. They were crude cups of coarse twigs filled almost to the top with fine matted matter.

Dryobates scalaris lucasanus. San Lucas Ladder-backed Woodpecker. This little denizen of brush and thick undergrowth requires a heavy stand of low cactuses in which to feed and rest. It occurs from the shores of the Gulf to the mouth of José María Cañon. Though the rarest of the resident Picidae it is still fairly common. Its nesting instincts are quite distinct from other *Dryobates scalaris*. They, similarly situated, would utilize sahuaro, it is true, but they would also be prone to add such substitutes as dry mescal stalks, telephone poles, tree yucca and mesquite and would, more often than not, choose one of these other sites by preference. But *lucasanus* confines itself to the cardón, at least in the district we were studying, selecting a single-stalked giant cactus and drilling its hole very near the top of the plant. As a result the nest-cavity is rather uniformly twenty feet above the ground. The entrance hole is at the top of a cavity typically five inches in diameter by fifteen in depth. No foreign material is brought in for a nest. The eggs lie on the chips that fall in the process of excavating.

The number of eggs in a clutch is two, three, or rarely four. The first two weeks of May find almost all the San Lucas Woodpeckers at the peak of laying. After the middle of the month nests with young may be expected. The parent bird will ordinarily flush, especially if his cardón be tapped, but is not very nervous about its home. It is too busy with family duties to waste much attention on strangers.

San Lucas Ladder-backed Woodpecker, 23 eggs average 22.9 x 18.1 mm.

San Fernando Ladder-backed Woodpecker, 9 eggs average 21.7 x 16.7.

Centurus uropygialis brewsteri. San Lucas Gila Woodpecker. The most abundant bird of its order, ranging throughout the territory examined. It is to be found in the suburban gardens of Santa Rosalía, among the palms of San Ignacio, and everywhere through the desert cactus belt. Its favorite choice of a home is a site high in a candelabra cardón; but it will also nest, even when not driven by necessity, in palms and tree yucca.

Its breeding season is quite long, fresh eggs being found from the latter part of April until well into June. The number laid is irregular. About half the sets are of two, but there are four's and even five's. Sixteen eggs taken in the vicinity of San Ignacio average 24.0 x 18.9 mm.

The birds are quite tame and often cannot be flushed. More than once, on opening cavities, we have lifted an adult from eggs or young, or even from an empty hole. Repeatedly a bird has been seen flying into a nest, either to feed young or to go onto eggs, while people were standing at the foot of the tree. When their homes are being examined the birds often approach within a few feet to voice their protests. Such fearlessness is unusual on this desert.

Colaptes chrysoides chrysoides. San Lucas Gilded Flicker. Like the other two members of the Picidae, this flicker is to be found, from coast to coast, as far as sahuaro associations extend. It is most common when the undergrowth is thick, as in the plains south of Santa Rosalía, the upland dry river beds, and the edges of José María Cañon. This distribution, of course, is a matter of food supply. The nesting and roosting cavities, actual or potential, are unlimited.

The birds are extremely wild, often flushing from a distance of a quarter of a mile. They lay in old cavities and, probably, also in those that are new; scarred sahuaro dries so rapidly that a definite determination on this point was not possible. The nests are usually twenty feet or more above the ground and the cavities are

generous; an eight-inch diameter and a two-foot depth are not unusual. Occasionally they will use natural openings in the cardón or holes that have been chopped open by honey gatherers.

The flickers lay from early April until well into June. The number of eggs in a clutch is normally three. With the single exception of one set of five we found none larger, and none smaller in which incubation had commenced.

San Fernando Gilded Flicker, 24 eggs average 27.1 x 21.3 mm.
San Lucas Gilded Flicker, 18 eggs average 26.3 x 20.9.

Phalaenoptilus nuttallii dickeyi. San Ignacio Poor-will.

Chordeiles acutipennis inferior. San Lucas Sharp-winged Nighthawk. These two birds may safely be accepted as breeders in the neighborhood of San Ignacio. They were present, the latter in especially large numbers, throughout the spring. We have every reason to believe that they do not lay locally until after the middle of June, and so, of course, we were able to learn nothing definite of their habits.

Calypte costae. Costa Hummingbird. This proved to be one of the most abundant birds of the cross section. Its distribution is not only peninsula-wide but also includes every association that meets its food requirements. Neither altitude nor climate affects its occurrence. In spite of its general range, however, an analysis discloses the existence of two distinct sets of breeding habitats. There are the birds of the open country and there are those of the oases. The former occur in large numbers in cactus and sage associations, just as they do in California. A few remain to nest. But diligent search resulted in the discovery of only two nests in the open desert. From that fact we infer that practically all of these birds are transients on their way north. Experience in the Vizcaino Desert and in southern California substantiates this belief.

The second group is numerically much the larger. It is concentrated in the jungles of the oases on both sides of the peninsula and is clearly composed of birds that have reached the end of their migrations if, indeed, they are not residents. They nest in the immediate proximity of surface water, sometimes snuggled into grape-vine leaves, sometimes near the tips of fig branches, but most often on the leaf stems of the date palm. The birds obviously seek and usually obtain the protection of living foliage. The sites selected average, in height above the ground, at least twice that of northern breeders; roughly eight feet against three.

The nests in the oases are built of a wide variety of materials. Plant down is the mainstay (the linings are nearly always of feathers)—sometimes only a suggestion, sometimes enough to cover the inside of the cup. On the outside are flakes of palm wood, weed bark, or sage leaves, more than one material seldom being used on any one nest, held in place with spider webs. The nests, generally speaking, do not differ from those in California so much in principle as they do in being more substantial and larger and far more carefully hidden. Thirty-six eggs from the oases average 12.2 x 8.1 mm. The season develops slowly. Early in April a few stragglers are nesting; the number increases through May and reaches its height in June.

There are before us here two somewhat contradictory sets of facts. On one hand neither Dr. Grinnell nor Mr. van Rossem has been able to separate the *Calypte costae* of California from that of San Ignacio. We know, also, that the California type migrates through this region and even stops here occasionally to breed. On the other hand there are irreconcilable differentiations in instincts and in habitat

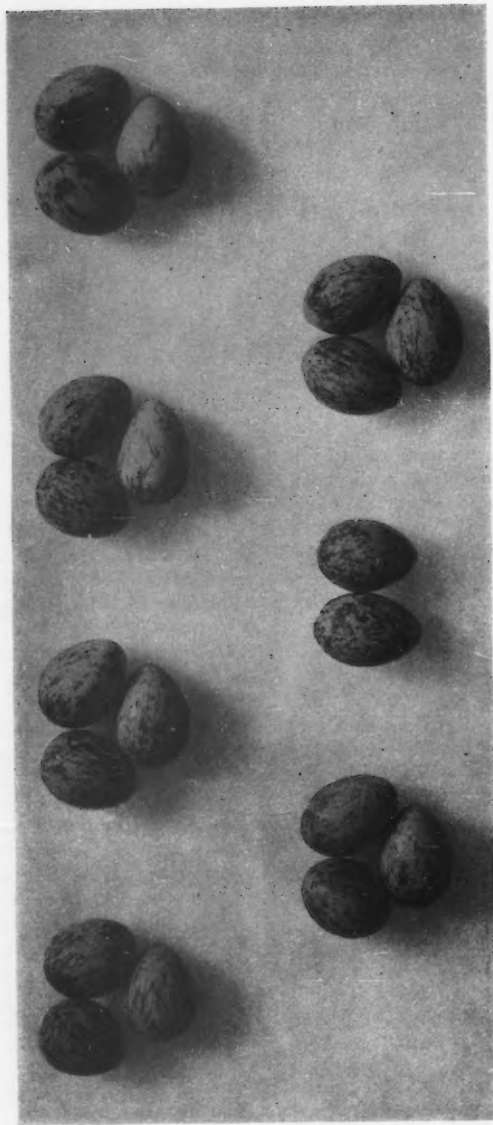


Fig. 12. SETS OF EGGS OF THE LOWER CALIFORNIA ASH-THROATED FLYCATCHER COLLECTED ON MAY 23, 1928, NEAR SAN IGNACIO.

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between the Costa Hummingbirds of the two associations. The only conclusion I can draw is that we are watching an interesting step in evolution—an incipient new race that in time will attain geographical isolation and probably consequential observable differences.

***Basilinna xantusii*.** Xantus Hummingbird. This, I believe, is the rarest of the local breeders. Two birds were observed at Santa Agueda and two at San Ignacio. In the latter village a nest containing two eggs was found on April 26. It was suspended from an inner lower twig of a cottonwood, eight feet above an irrigation ditch. Four eggs of *xantusii* average 11.9 x 7.9 mm.

***Myiarchus cinerascens pertinax*.** Lower California Ash-throated Flycatcher. Quite common throughout the region. The birds prefer to spend their time on branches shielded from direct sunlight, but in doing so they do not seek concealment. They nest in abandoned holes of woodpeckers, ordinarily in those in cardón, occasionally in cavities in palm or tree yucca. The giant cactuses selected are usually in barren surroundings; these ash-throats are not lovers of thickets.

The birds take into their nesting holes enough short hairs or fur or wool to form a substantial felt pad. Once they are established they will not flush. If disturbed or threatened they remain in their cavities, making vigorous oral protests. Their laying season begins in May. Three eggs definitely constitute a clutch.

M. c. cinerascens, 31 eggs average 22.8 x 17.0 mm.

M. c. pertinax, 18 eggs average 23.1 x 17.2.

***Sayornis nigricans brunnescens*.** San Lucas Black Phoebe. This little flycatcher is quite conspicuous and fairly common from Santa Agueda to San Joaquin, but we did not observe it farther west. Its breeding habits offer some striking contrasts to those of *S. n. nigricans*.

The Lower California bird has not taken advantage of civilization by adopting houses or bridges as supports for its nests. An exception might be entered in the case of uncovered wells. They were frequently used, the birds building as far as twenty feet below the surface. The San Lucas Black Phoebe wants its home to be over water and to be well concealed. Whether it accomplishes this purpose by building in rock or against an earthen bank or under projecting palm roots is a matter of secondary importance. Protection from above there must be, in all cases.

In the cup of the nest hair is not used. Shredded palm fibre and long strips of very fine weed bark are the favorite linings. Egg laying commences in March and continues at least until the middle of June. The number in a set is either three or four, usually the latter. Of the 34 eggs we measured, 7 were marked with reddish spots, 7 were very faintly marked, and 20 were plain white. Each type of marking occurred at least twice as frequently as it does on California-taken eggs.

The following measurements suggest that there is no constant difference in the sizes of the eggs of the three subspecies.

Sayornis nigricans nigricans, 45 eggs average 19.0 x 14.9 mm.

Sayornis nigricans salictaria, 13 eggs average 19.2 x 14.8.

Sayornis nigricans brunnescens, 34 eggs average 19.1 x 14.8.

***Pyrocephalus rubinus mexicanus*.** Mexican Vermilion Flycatcher. Abundant from the Gulf to San Ignacio and San Joaquin, where its range comes to an abrupt termination. These birds are lovers of the irrigated oases and consequently are not averse to the presence of mankind. Their laying season begins in April and continues at least until the middle of June. Those whose nests we disturbed built and laid again within two weeks, almost always in the same tree.

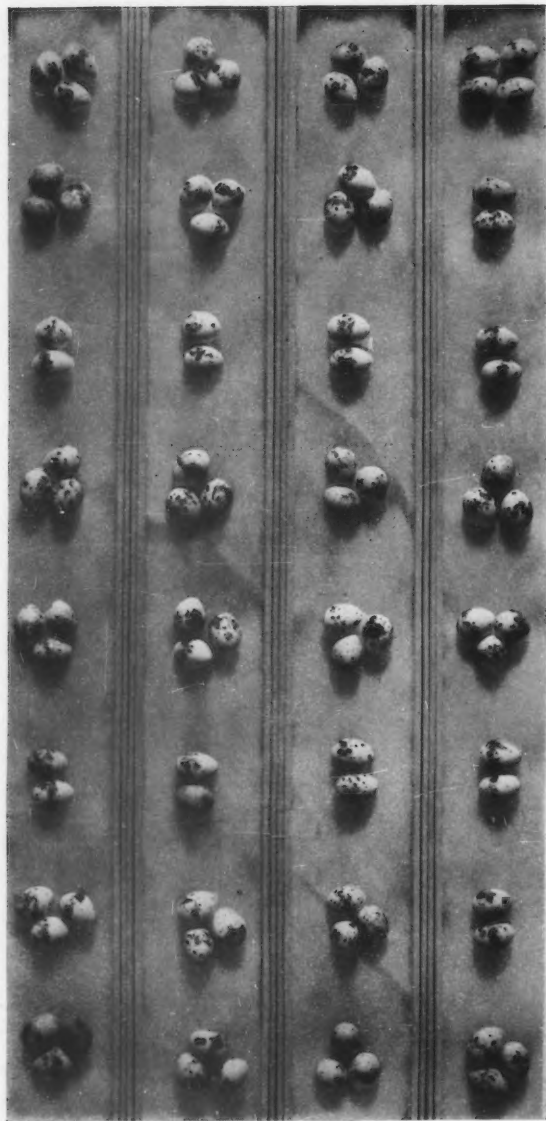


Fig. 13. SETS OF EGGS OF THE MEXICAN VERMILION FLYCATCHER COLLECTED IN THE REGION OF SAN IGNACIO FROM APRIL TO JUNE, 1928.

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The favored site is a crotch in a mesquite. The nest is so small and flimsy that it must be supported laterally as well as from below. It consists of a little fringe of twigs, a shallow cup of plant down, and a lining. This last is anything from a mere suggestion to a substantial padding. It is often made entirely of the feathers of larger birds. The recesses behind the cut stubs of fan palm leaves are much used sites for nests and occasionally they are placed in grapevines, olives, or ornamental trees in the gardens. The height above the ground ranges from four to fifty feet. Normally the nests are placed eight to ten feet high and midway between the tree trunk and the tips of the branches.

The number of eggs laid is either two or three, with one set of four on record. The 103 eggs measured averaged 17.15×13.54 mm. The shells are usually white, though they may be cream, tan or even brown. The blotches vary in intensity and design. They are black and ordinarily overlay fainter bluish-black markings. In extreme examples the eggs are rich chocolate brown mottled with black.

Otocoris alpestris enertera. Magdalena Horned Lark. We observed no other Horned Larks and we found these only along the extremely narrow littoral on the edge of San Ignacio Lagoon. There they were quite common. The tidal border of the lagoon is so nearly level that a flat of from a quarter to a half mile in width is exposed when the waters recede. As the level of the sea goes down these Horned Larks appear in numbers on the dark hard-surfaced mud where they search diligently for small invertebrates. As far as we could ascertain these constituted their only food supply.

They are early breeders. When we worked among them on May 25, the young were on the wing and the adults were in heavy post-nuptial molt. We did not find a nest to record. Just above high water mark there are ideal nesting sites in low sand dunes supporting a scant growth of sage. There, I am sure, the birds had bred.

Aphelocoma californica hypoleuca. Xantus California Jay. The habitat of these jays is arboreal associations other than those of the oases. The level country adjoining San Lucas Lagoon in places is heavily overgrown with mesquite and palo verde. The small cañons in the mountains support scattered trees. The large valleys are frequently dotted with them, especially where moisture is not too far beneath the surface. The riparian associations are almost uniformly accompanied by the taller growths. Within these limitations *hypoleuca* is common, for a jay. Its conduct in the field is not dissimilar to that of its northern relatives, and it is but little more shy than they. It alternately hides in the thickets and comes out into the open; and it is the familiar scolding busybody, except when near its own nest.

The breeding habits of the Xantus Jay, however, are unlike those of the other races of its family, partly through choice and partly from necessity. Nearly all the nests we found were in the arrow tree whose dense growth of leaves afforded a maximum of concealment. The nest is usually in the heart of the foliage, six to ten feet above the ground. It consists of a foundation of fine twigs which support a semispherical cup. The foundation may be scanty or it may be quite pretentious, according to the requirements of its location. The cup is thin and neatly woven. It is composed of fine rootlets, tree yucca fibres, or cow-hair. It may be of one material only or the three may be used together. It is stiff enough to maintain its shape; the foundation merely serves to hold it in place.

Laying begins in April, two eggs being the usual number. Reversing the customary order, as the season progresses the size of the clutch increases until, in June, we found three more often than two. That number represents the largest

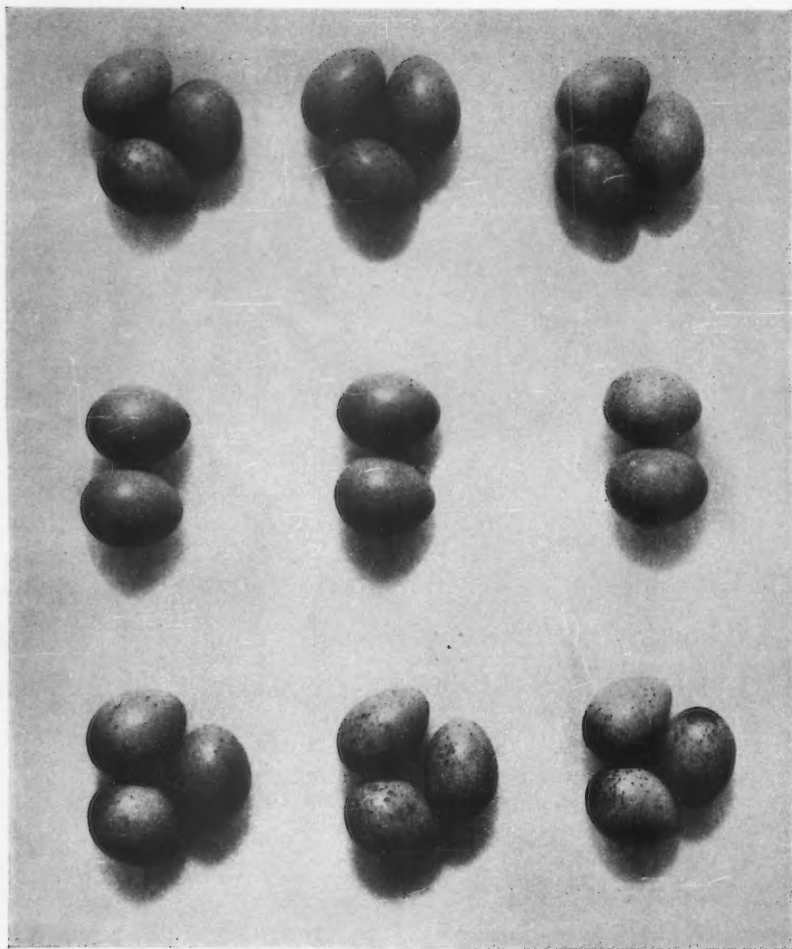


Fig. 14. SETS OF EGGS OF THE XANTUS CALIFORNIA JAY COLLECTED FROM APRIL TO JUNE, 1928, IN THE REGION OF SAN IGNACIO.

set of which we have knowledge. The eggs differ from those of any other subspecies of the California Jay in averaging a very much greener background and in being marked with decidedly finer spots. The illustration shows the small dots, and also the greater rotundity, as borne out by comparative measurements.

Swarth Jay,	63 eggs average	27.3 x 20.8 mm.
Grinnell Jay,	28 eggs average	27.7 x 21.0.
California Jay,	48 eggs average	27.7 x 21.1.
Belding Jay,	3 eggs average	28.4 x 21.0.
Xantus Jay,	24 eggs average	26.2 x 20.5.

Corvus corax sinuatus. Western Raven. Raven, vulture and caracara divide the role of scavenger. About Santa Rosalía the first two are so plentiful as to be gregarious. They haunt the offal dumps and the garbage piles, the beaches and the burro yards. The status of semi-domesticity, however, exists in this one town only. Away from its immediate environs ravens were not at all common. We did find them in unbroken sequence to the Pacific, but only a pair here and another there, at intervals usually of many miles, which hunted together and guarded their domains just as they do on California's coast.

These inland and western birds nest near their food supply. They build in a normal manner on cliffs or more often in tree yucca or multi-fingered cardón. But where the ravens were plentiful, on the eastern slope, their breeding remains a mystery. On one point we were satisfied: in spite of innumerable pitted cañon walls and cardón they do not lay near human habitation.

Icterus cucullatus trochiloides. San Lucas Hooded Oriole. These orioles are abundant locally at widely scattered points, notably at the oases as far west as San Joaquin. They are rarer in the tree yucca associations in the valleys. Their nesting season begins early in May and reaches its peak about the first of June.

The nests are built of fibre. In the oases it is taken from palms; on the deserts from the tree yucca. On the bottoms of the cups there is a pinch of white plant down, usually covered with a few strands of fibre. The nests are suspended from three or four points by threads interwoven about the support. One kind of fibre only is used in any given nest. There appear to be no exceptions to these generalities. The nests are usually built on the underside and in the middle of the lowest leaf of fan palms. We also found them, in order of occurrence, in tree yuccas, date palms, olive, fig, and banana trees.

There is no observable difference in the size of the eggs of *trochiloides* and *nelsoni*. The southern bird, however, lays fewer than the other. Two was often a complete set; three was the more usual number as well as the maximum.

Arizona Hooded Oriole, 48 eggs average 22.7 x 15.6 mm.

San Lucas Hooded Oriole, 128 eggs average 22.6 x 16.0.

Carpodacus mexicanus ruberrimus. San Lucas Linnet. A common and conspicuous bird about houses and gardens, but rare in natural surroundings. It spreads from tide-water on the Gulf to the mouth of José María Cañon. The sites most frequently chosen are on the outsides of occupied houses. Where the walls are of tule stems the linnets work their way between the upright stalks. The beams under the eaves and even the thatched roofs of adobes are also favored spots. We found many nests in olive trees and in various odd locations. On the desert, mistletoe in mesquites or flicker holes in cardón are most frequently used.

The laying season commences early in April and continues at least past the middle of June. The number of eggs in a set varies from two to four, with five on record. Clutches of three's and four's are of about equal occurrence. Weed bark in strips, gray in color and of soft texture, largely replaces stiffer materials found in northern nests.

The Mexicans quite frequently trap these birds or take young from the nests. When kept as cage pets nearly all the males lose their bright red coloration, it being replaced with dull yellow. This fact, properly interpreted, might shed light on a vexing question of chromatics. In a state of nature yellow feathers are unknown in this area.

The egg markings and shades show no constant differences. The following table shows measurements of Linnet's eggs from different localities.

Guadalupe Island,	38 eggs average	20.1 x 15.4 mm.
San Clemente Island,	36 eggs average	19.2 x 14.6.
New Mexico,	34 eggs average	19.0 x 14.2.
San Diego County,	60 eggs average	19.1 x 14.1.
Vizcaino Desert,	24 eggs average	19.1 x 14.1.
Central Lower California,	154 eggs average	18.8 x 13.9.
Guaymas, Sonora,	16 eggs average	17.8 x 13.8.

Spinus psaltria hesperophilus. Green-backed Arkansas Goldfinch. Recorded only from San Ignacio. The birds are fairly common in the gardens near the reservoir, where they begin to nest the first week in April. They build of plant down and the finest weed barks. They place their nests, by preference, in the grapevines, though it is by no means unusual to find them either in willow or in fig trees. The nests are cunningly hidden by parents wilder than any other finches within my experience. With the exception of one set of five, three eggs was the size of all the clutches we found.

20 eggs gave average dimensions of 14.1 x 11.4 mm.

Passer domesticus. English Sparrow. Resident and breeding only in Santa Rosalía. They must have reached the town by boat, either from San Pedro or Guaymas, for there is no evidence of their having come overland. They were abundant in all parts of Santa Rosalía and its suburbs and, as was to be expected, bred throughout the spring season.

Amphispiza bilineata deserticola. Desert Black-throated Sparrow. Our knowledge of the breeding habits of this sparrow is confined to two sets of two eggs each, taken the latter part of May. Both were in semi-desert, semi-riparian associations, being placed well inside thick bushes at a height of thirty inches. The nests were substantially built of long grasses and well lined with cow hair. The two eggs we collected are light blue, unspotted, and averaged 17.3 x 13.8 mm.

Amphispiza belli cinerea. Gray Bell Sparrow. We saw one bird which we procured. It was taken in the scrub brush country between José María Cañon and San Ignacio Lagoon, on May 27. The plumage was badly worn and the breeding season well in the past.

Melospiza melodia rivularis. Brown Song Sparrow. This light-breasted type of *Melospiza* occurs wherever there are pools of water with tule or willow. It breeds in Santa Agueda Cañon, at San Ignacio, San Joaquin, Alamo, and in José María Cañon. It is by no means as abundant in these localities as is, for instance, *M. m. cooperi* in the willow bottoms of southern California. Still it can hardly be regarded as rare.

The birds begin to lay the latter part of April and continue for at least six weeks. Most of the nests are bulky affairs of tule, usually lined with palm fibre or cow hair. They are normally placed in tule about four feet above the water. The one here illustrated was originally surrounded by loose and fairly long dead tule leaves. These more than equalled the bulk of the nest as photographed, but they could not be saved for the camera. Some of the nests found were in willow trees and one was in a thick weed clinging to a rock and overhanging a pool. In general, excepting the unusual size of their nests, the habits of the Brown Song Sparrow were much like those of the San Diegoan form. They lay either two or three eggs, with four the record.

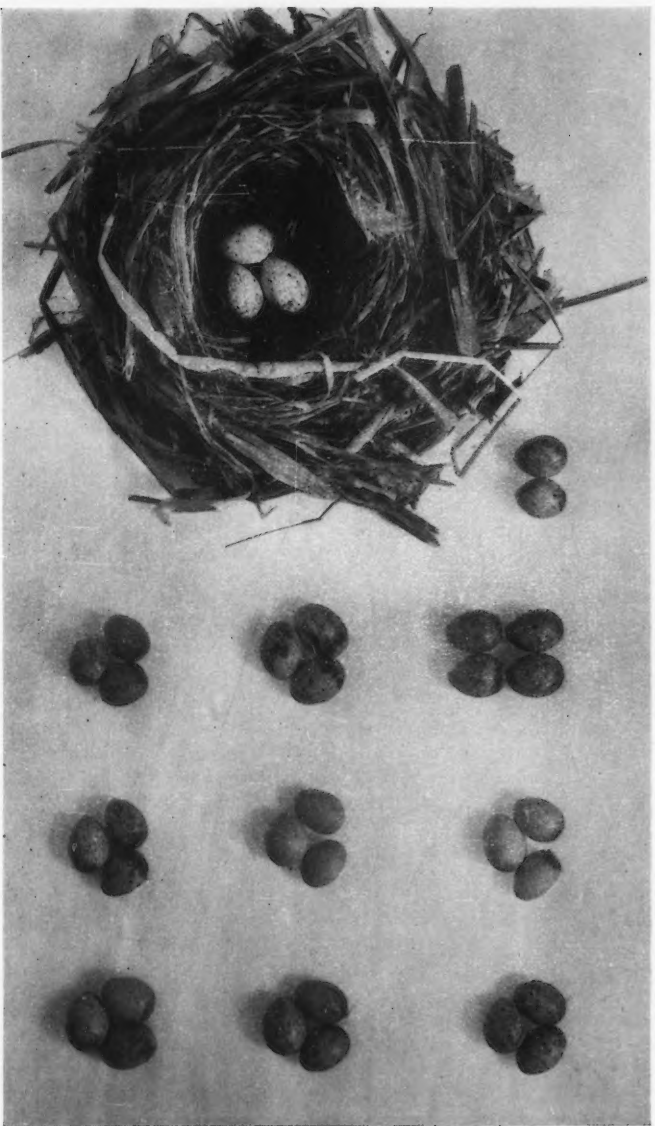


FIG. 15. NEST AND SETS OF EGGS OF THE BROWN SONG SPARROW COLLECTED FROM APRIL TO JUNE, 1928, IN THE REGION OF SAN IGNACIO.

The eggs themselves are unlike those of any other Song Sparrow I have examined. They are more brilliant than those of the northern birds, a brighter blue, and altogether lacking in the common tan type, in which the spots are so close together as to give the appearance of a reddish egg. The photograph brings out the details of all the types.

From San Ignacio, 35 eggs average 21.2 x 15.9 mm.
From El Rosario, 250 eggs average 20.1 x 15.2.
From San Diego County, 110 eggs average 19.9 x 15.2.

Pipilo fuscus aripolius. San Pablo Brown Towhee. Very rare and observed only in the higher altitudes, one thousand feet or more, and on the Pacific slope. It makes its home along the stream beds where the riparian arboreal growth is dense. We have convincing evidence that it breeds wherever found, but were not fortunate enough to take a set of eggs.

Richmondia cardinalis ignea. San Lucas Cardinal. A rather common bird in such a favored locality as José María Cañon; not rare in any riparian association, but not to be found, except accidentally, in palm jungles, in the open desert, or in the chapparal country. The male cardinal is aggressive and inquisitive. He loves to chatter and sing from the top of one of the small trees. If his nest is threatened he becomes a crimson meteor, swooping to defense with vociferous protests. His mate seldom appears above the bushes; she is shy and retiring and relies on the protection of her quiet colors.

There is striking contrast in the nesting sites preferred by the three races in the northwestern corner of the range of the species. About Guaymas and its environs there are great plains studded with head-high dwarf mesquite. The plants grow at wellspaced intervals and are somewhat less dense than is the sage on a typical California mesa. It is in this association and with no apparent desire for concealment or shelter that the cardinals build. They evince no aversion for more or less inhabited regions. I found one nest with three half-grown young not a hundred feet from a small settlement. These birds are indifferent to available water or riparian associations. They neither shun the thickets nor are they attracted to them, for they are typically birds of the semi-open country.

In southern Arizona, near San Xavier Mission, we found cardinals breeding quite plentifully, in June, 1923. Most of them selected the larger and denser trees and built well inside, so that the nest was carefully concealed. They frequented the thickest riparian undergrowths, where the tangle on the alluvial soil attained a height of twenty feet or more.

To our Arizona experience I attribute our lack of success in finding eggs of the San Lucas Cardinal. One set of two was all we collected. Later, when we had learned not to hunt the thick attractive growths back of the river banks, we did find half a dozen nests. By that time it was June and the laying season was past. Almost grown young were in the nests; they were surprisingly uniform in age and were always three in number. On the overhanging lateral branches of mesquite, half way from trunk to tip and four feet above the dry river beds, were the sites of these nests. The female was seldom seen, but the male, whenever a brood was approached, was a game fighter and a watchful guardian.

Pyrrhuloxia sinuata peninsulæ. San Lucas Pyrrhuloxia. Very rare in the region under discussion and perhaps unknown on the western slope of the peninsula. I have a pair of live birds which, the natives told me, were taken in 1927 from a nest near San Ignacio. In Santa Agueda Cañon pyrrhuloxias are more plentiful,

five or six having been observed there during the spring. Their distribution is inverse to that of the cardinals, though there are spots where the ranges of the two overlap. The pyrrhuloxias of the Santa Rosalía and Mulegé district average smaller than those from the Cape.

Phainopepla nitens lepida. Northern Phainopepla. These birds are plentiful in José María Cañon, but they become progressively less so as one travels eastward. They are gregarious to the extent of perhaps a dozen pairs in especially favored spots where the mesquite is at its best and food supply is exceptional. They are absent, locally, from altitudes of over a thousand feet.



Fig. 16. MESQUITE-COVERED PLAIN NEAR SAN LUCAS AT LATITUDE $27^{\circ} 14'$ ON THE GULF COAST OF LOWER CALIFORNIA. NORTHERN PHAINOPEPLAS FREQUENTED THIS TYPE OF HABITAT.

The breeding season opens the middle of April but does not reach its height for another month. The season is six weeks later than is that of the phainopepla of the Colorado Desert, but it is slightly in advance of that of the birds of the San Diegan District. In California we expect to find the nests resting against the larger limbs of trees. In the San Ignacio region nearly all were placed in mistletoe or suspended beneath it. That condition, however, is not peculiar to this region, for I have observed the same thing near Ensenada.

The nests were typical, small and built of fine gray plant down reinforced with tiny twigs and leaves. They were ordinarily placed eight to twelve feet above the ground, though some were much higher.

The number of eggs in a set is either two or three, the latter being more common and an exception to the very general rule that the San Ignacio birds lay more sparingly than do their northern counterparts. The variations in the individual eggs,

in shape, size, and markings, were pronounced. Some were practically spherical and others extremes of elongation.

From San Ignacio to José María Cañon, 20 eggs average 22.6 x 16.5 mm.
From California and Arizona, 14 eggs average 22.2 x 16.6.

Progne subis hesperia. Lower California Purple Martin. In the sandstone associations between José María Cañon and the lagoon there is a colony of martins. It stretches for miles over rolling dunes and low cliffs. During the last week of

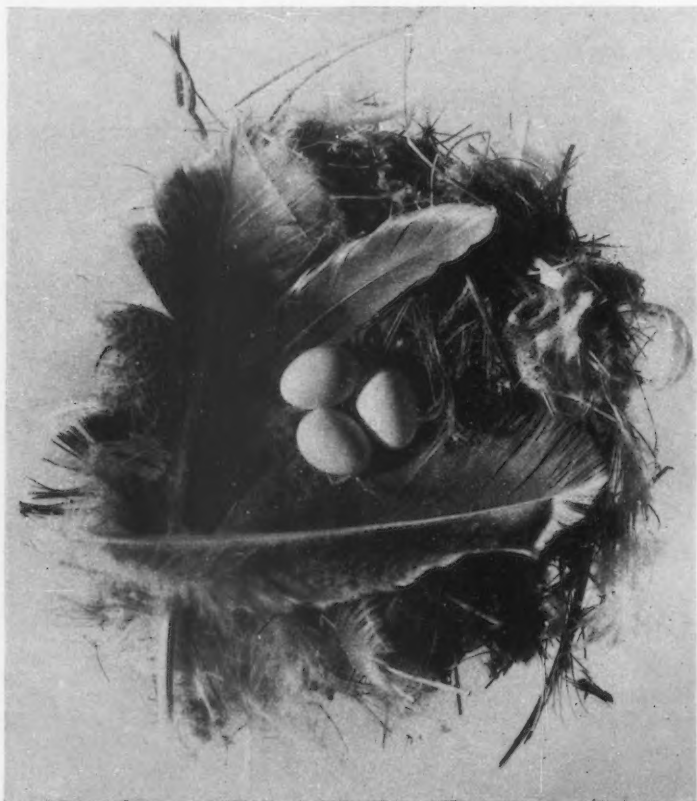


Fig. 17. NEST AND EGGS OF THE SAN LUCAS VIOLET-GREEN SWALLOW, COLLECTED ON MAY 30, 1928, AT SAN IGNACIO.

May, 1928, several hundred pairs were present. We found no nests and it was evident that the birds were not yet breeding, for among the circling insect hunters the sexes were equally represented. Early in June a few birds were in San Ignacio. These, as mated pairs, showed a decided interest in some of the woodpecker holes in the cardón, but made no further use of them.

Tachycineta thalassina brachyptera. San Lucas Violet-green Swallow. If not the most abundant, at least the most conspicuous, bird in the cross section. It fairly swarms about the reservoirs and, paradoxically, is common on all but the most sterile plains. Its breeding range includes the cardón belt.

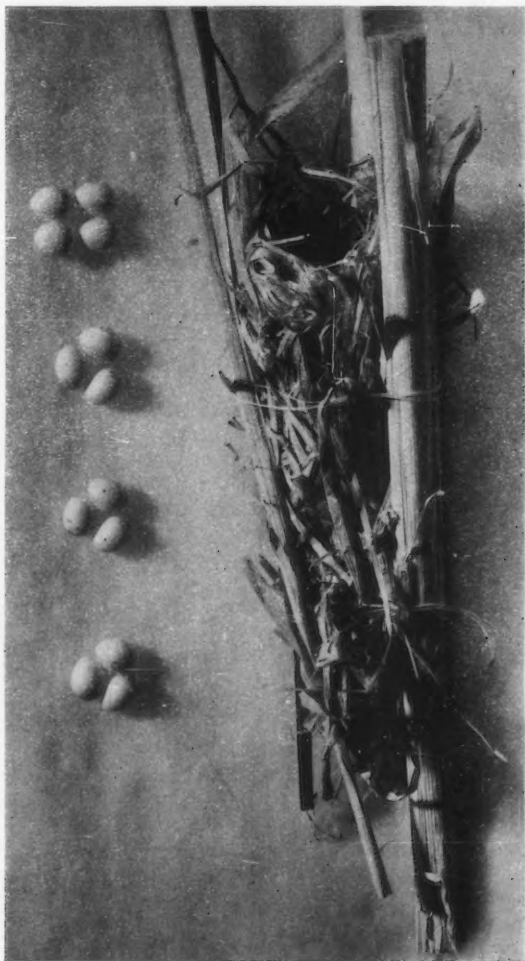


Fig. 18. SETS OF EGGS AND A NEST OF THE GOLDMAN BELDING YELLOW-THROAT, COLLECTED FROM MAY 5 TO 20, 1928, AT SAN IGNACIO.

The San Lucas Swallow breeds in woodpecker holes, preferably those near the center of the sahuaro. It makes a substantial nest of relatively large feathers; owls

appear to be a favored source of supply. The laying season begins as early as the first of May and fresh eggs are to be found throughout that month. Three is the invariable size of the clutch, as far as our experience went. That was largely based on young in the nest. The one set of three and the single egg we saved averaged 16.6×13.4 mm.

Lanius ludovicianus nelsoni. Nelson Loggerhead Shrike. There are shrikes near Santa Rosalía. In any small cañon which runs back from the Gulf and which also contains a few trees, three or four, perhaps a breeding pair, of these birds are apt to be found. They nest near San Ignacio Lagoon and among the sand dunes along with the Desert Thrasher. They occupy, intermittently, the terrain between these extremes, but only in associations either of low brush or of isolated trees. On the whole they are to be listed as rare birds.

The breeding season is well under way in March and does not extend beyond April. Either three or four eggs are laid, in bulky nests of tree moss. There is no lining in the cup. The building material, which is the same throughout, is itself soft enough for the eggs. Four average 24.3×18.2 mm.

Dendroica erithachorides castaneiceps. Mangrove Golden Warbler. Confined to the mangroves of San Lucas Lagoon. The birds are quite abundant, considering the restricted area. They put in appearance, in migration, early in May. They are included among the birds whose nests we did not find; and our only breeding record is a juvenile, barely able to fly, taken June 12, at San Lucas Lagoon.

Geothlypis beldingi goldmani. Goldman Belding Yellow-throat. Resident in Santa Agueda, San Ignacio, and San Joaquin, the only localities where there is tule. These birds do not appear to care for willow associations. They are fairly common, especially in San Ignacio, where they nest in the heart of the heaviest tule patches. Their nests are strips of dead tule leaves, well woven and tied around several living stalks. The linings show individual variations but are usually of palm fibre. The nests are decidedly larger than those of more northerly birds.

The laying season is short; we found no eggs before May 5, nor after the 20th. The eggs of *goldmani* are a dull white, heavily spotted about the larger end, but otherwise almost immaculate. The decorative scheme is complicated. There are blotches, up to a millimeter in diameter, and a few hair lines which are jet black. A majority of the spots, many three millimeters long, are so weakly pigmented that they are gray and even have a suggestion of a lavender cast. Mixed throughout are specks of either color.

The nests vary little from one another. The one here illustrated is typical, except that its tule stems should have been drawn more tightly together. The eggs show all the types of which I have knowledge. Their greater size is by no means their only specific contrast with *G. trichas*. The table of measurements is more consistent than the scarcity of material would suggest.

Goldman Yellow-throat,	13 eggs average 18.7×14.5 mm.
Tule Yellow-throat, El Rosario,	16 eggs average 16.8×13.6 .
Tule Yellow-throat, California,	15 eggs average 17.5×13.6 .
Salt Marsh Yellow-throat,	18 eggs average 17.6×13.1 .

Icteria virens longicauda. Long-tailed Yellow-breasted Chat. In San Ignacio and San Joaquin the laying season begins about May 1, and fresh eggs are to be expected as late as the first week in June. About half the sets we found contained two eggs, the others either three or four. In their habits the birds presented no

consistent traits that differed from those of their northern relatives. They are rare; we did not account for more than a dozen pairs, and those only in the oases mentioned.

San Ignacio,	23 eggs average	22.4 x 17.1 mm.
Vizcaino Desert,	6 eggs average	22.9 x 17.2.
San Diego County,	30 eggs average	22.4 x 17.0.

Mimus polyglottos leucopterus. Western Mockingbird. Decidedly uncommon but widely distributed. Near San Lucas Lagoon, mixed with the mesquite, there is a thick growth of thornless trees. These are usually from six to ten feet in height. Here are about half the mockingbirds within our zone. José María Cañon harbors quite a few, as does the more heavily covered portion of San Ignacio Arroyo, just east of the town. Occasionally, but not often, isolated pairs are to be seen at other spots along the route, or even in the open desert.

The mockingbirds of this region are incredibly shy, seldom allowing approach to within a hundred yards. When their suspicions are aroused they dive into bushes and work their way from one to another, covering considerable distances without exposing themselves to view. In their breeding habits they are even more secretive. We found but one nest, it being near the western end of José María Cañon. On May 25, it contained three heavily incubated eggs. The nest was larger than those built by jays or thrashers. The foundation was of fine but rather long thorny twigs. They held a cup of stiff rootlets and plant fibres. The nest was placed, at a height of six feet, in the heart of a shrubby mesquite growing in dense riparian mesquite association. It was well hidden by the foliage of the tree and by the mistletoe above.

Toxostoma cinereum cinereum. Cape San Lucas Thrasher. These thrashers are relatively common wherever there is any considerable growth of small cactuses. Their distribution is in direct proportion to the density of the required growth. It is, therefore, peninsula-wide and unaffected by altitude or climate except in so far as those factors determine the abundance of the cactus. That growth is most dense near the ends of the cross section. It comes to an abrupt termination, together with the habitat of these thrashers, where the sand dune association begins.

Nothing has been published contrasting the breeding habits of the two forms of San Lucas Thrasher, though a comparison should be of interest. The Mearns San Lucas Thrasher (*Toxostoma cinereum mearnsi*) reaches the height of its breeding season six weeks to two months earlier than does *T. c. cinereum*. That means March and April for one and May and June for the other. They lay either two or three eggs; I have one record of four for each. The more northerly bird lays three much more often than two; the converse is true of the other thrasher. The eggs themselves are not distinguishable. They resemble those of the Bendire Thrasher (*Toxostoma bendirei*) so closely that identification is possible only from averages of color and sizes.

Mearns San Lucas Thrasher,	47 eggs average	28.1 x 19.9 mm.
Cape San Lucas Thrasher,	92 eggs average	27.3 x 19.5.

In its conduct in the field the Mearns Thrasher is more shy, by far. It seldom allows a close approach and I have never known one to betray its nest. The Cape bird depends more on concealment and is not notably wary. It frequently hovers about its nest, and on many occasions I have flushed sitting birds at a range of a few feet. These characteristic traits harmonize with the preferred associations.

The nesting of the two birds presents the strongest antitheses. The Mearns, with but two exceptions noted, builds in cactus. There are many varieties of this

plant within its range, and they are used indifferently, flat-leaf, cholla of two or three species, and especially the pitahaya and garambulla. It is to be noted, however, that a given individual pair of these birds adheres uncompromisingly to one species of cactus. If, in the breeding season, you find an old thrasher nest and search the surrounding country you are apt to find another old nest in every satisfactory plant of the species which contained the first. If you have sufficient patience and luck you will also find an occupied nest in the same kind of plant. The normal site is on the lower and outer branches, say of a cholla, well protected from above and



Fig. 19. NEST AND EGGS OF THE CAPE SAN LUCAS THRASHER, COLLECTED MAY 29, 1928, AT SAN JOAQUIN, IN THE SAN IGNACIO DISTRICT.

three feet off the ground. In pitahaya such sites are impracticable but are approximated as closely as possible.

The Cape bird is entirely free from these personal prejudices. It builds about half its nests in or under mistletoe, therefore most often in mesquite. It uses cholla frequently, the crotch of a cardón, or an arrow tree or other thorny growth. The same pair may utilize, in successive seasons, three or four types of sites. If in a

scrub tree it may be anywhere from the heart to the outer branch tips. It will on the average be perhaps ten feet above the ground.

The nests themselves are not very dissimilar, though those of the Vizcaino Desert average somewhat larger and they are more substantial than the others. A good understructure of rather short and fine twigs holds a hemispherical cup. This is thicker and deeper than that of the jays and is built of thread-like rootlets. It is of the same material throughout, the only suggestion of a lining being an occasional feather, or bit of lizard skin, or perhaps a pinch of cotton.

Toxostoma lecontei arenicola. Santa Rosalia Leconte Thrasher. There comes a break in the topography of the country where the cactus and other typically desert associations give way to low sand dunes and thornless vegetation. A marginal strip of irregular width, nowhere exceeding a few miles, reflects the direct influences of the ocean. This littoral is the home of the so-called Desert Thrasher. A better understanding of its habitat may be had by appreciating how misleading is its customary name. *T. l. lecontei* is the desert dweller of the species. The "Desert" Thrasher does not wander at all into what we conceive to be the desert.

A study of old nests reveals the fact that the breeding season is long past by the middle of May. It does not begin, however, until well into March. The sites chosen are, of necessity, in small bushes, but there is a consistent preference for those which afford the maximum protection. That desire satisfied, the birds indifferently build in the heart of the shrub or near its outer edges. The foundation is composed of thorny twigs from three to six inches in length. They support a cup which, in thickness and size, is midway between that of the shrike and that of the San Lucas Thrasher. The inside walls and especially the bottom of the cavity are padded rather than lined.

The habitat of these thrashers harmonizes well with their dull gray backs and lighter underparts. They are decidedly ground-loving birds, skulking from bush to bush and seldom flying. When alarmed, unless the fright is too sudden, they run from danger. This they do with surprising speed, taking to the air only as a last resource. The southern shore of San Ignacio Lagoon is their metropolis in our cross section, but even there the birds are quite rare. In three days we saw not more than a dozen.

Heleodytes brunneicapillus affinis. San Lucas Cactus Wren. These wrens, while common, are not nearly so abundant as experience elsewhere would lead one to expect. It is not easy to define their range because, in exceptional cases, they breed among the palms of the oases as well as on the lava mesas. But in general they limit themselves to areas of intermediate fertility, shunning alike heavy undergrowth and associations of scant vegetation. That leaves them the less rocky valley floors and most of the stream beds as well as the narrowing cañons and the lateral branches running into the hills. The birds are appreciably more plentiful at the higher altitudes.

In their choice of nesting sites the Cactus Wrens indulge in a wide range of individual preference. The most popular selection is the upper part of a cholla or the center of a palo verde, but nests are not at all unusual in any low cactus, in mesquite or other trees, in heavy mistletoe, in the crotches of sahuaros, or within woodpecker holes. A formidable list could be made of unusual locations. There is, with the exception of the lining, a marked uniformity in the construction of the nests. Long fine grass stems are used as the basic material. These are woven into gourd shaped structures fifteen to eighteen inches long with the nesting cavity inside. Entrance is effected through a five-inch tunnel. The lining is almost always pro-

fuse and is usually of the feathers of some larger bird. Sometimes it is of plant down and in one nest nothing was used but native cotton.

The number of eggs laid is two. Of the many sets examined I found but one that contained three eggs. Incubated singles were unusual rather than rare. The laying season begins about April 25, in a desultory way, and is not under full head until past the middle of May.

The following table of measurements must be scanned with charity because the number of specimens is small in comparison with great individual variations.

<i>H. b. brunneicapillus</i> ,	24 eggs average 23.3 x 16.4 mm.
<i>H. b. couesi</i> , Colorado Desert,	37 eggs average 23.5 x 17.2.
<i>H. b. couesi</i> , San Diegan District,	44 eggs average 24.6 x 17.3.
<i>H. b. bryanti</i> ,	70 eggs average 24.9 x 17.1.
<i>H. b. affinis</i> ,	50 eggs average 24.3 x 16.9.

Salpinctes obsoletus obsoletus. Northern Rock Wren. Occurs only in the lower levels of the cañons running back from the Gulf. In Santa Agueda the birds were quite common in and around adobe ruins, cobble stone fences, and cañon walls. Their breeding season appears to be early; I do not believe it extends beyond March. We were not sufficiently fortunate to find a nest in our cross-section, though we have found the bird breeding both to the north and south. On the islands, San Luís and Ildefonso, the birds lay in February. That may be indicative of mainland dates.

Catherpes mexicanus punctulatus. Dotted Cañon Wren. The metropolis of this bird is the town of San Ignacio. Thence the breeding range extends east and west for several miles along the rocky stream bed. The birds are tame and have become as fully domesticated as are House Finches. For instance, our camp was in the center of town in a twenty by forty foot adobe that had a high gabled roof of palm leaves. A pair of cañon wrens made their home with us, flitting about the room unconcerned by our presence and regaling us with many hours of sweet singing. Needless to say they were not added to our collection nor was their home disturbed.

In the crevices of the old stone mission a number of these birds breed, in security and peace. They spread to adjoining buildings apparently without regard to occupancy. Two of the nests we located were in holes that had once carried wooden cross beams over adobe doorways and one was on the top cross-piece of a gabled roof. The fact that ten or twelve people lived and slept in this room in no way deterred the birds. The fourth nest was on a flat shelf, about eight by twelve inches in width, half way up the inside wall of a combined chicken and ware house.

While the nest sites were unlike those of the Cañon Wren of southwestern California the nests themselves were not. They all were soft-padded masses of animal and plant down with an occasional twig run through, the whole held together with a liberal supply of spider web. They were lined, sometimes a quarter of an inch deep, with white plant down. Often there was no lining. The larger size of the northerly clutches, averaging six, requires a correspondingly larger nest.

Cañon Wren, San Diego County,	30 eggs average 18.3 x 13.7 mm.
Cañon Wren, San Ignacio,	13 eggs average 17.9 x 13.3.

Auriparus flaviceps lamprocephalus. Cape Verdin. This is the most widely distributed and, I believe, the most abundant of the local birds. It occurs in every association of the region under discussion, excepting only the littoral sand dunes. On the lava-strewn mesas, where vegetation is barely able to maintain a foot-hold and where animal life seems almost impossible, isolated pairs of these fascinating

little workers are to be found regularly and in surprising numbers. In the irrigated river beds they seek open spots where here and there a stray mesquite or a bit of cholla has been permitted to remain. Brush-covered mountain slopes, plains dotted with cholla, cardón, and tree yucca, dry river beds supporting dense mesquite and palo verde, and cañons where the palo blanco grows are equally their home sites.

Their geographical range is unbroken from the shores of the Gulf of California to the edge of the desert, south of San Ignacio Lagoon. There is not a gap along this line from which these birds are absent. I have a nest taken on the beach near Santa Rosalía and one taken at the mouth of José María Cañon. But if they are indifferent to environment they are insistent and particular in their choice of nesting sites. Fifty per cent of the nests are in cholla, forty per cent in mesquite, and the other ten per cent scattering. The latter include anything from elephant trees to matilija poppies.



Fig. 20. SAN IGNACIO AS SEEN FROM THE MESA TO THE EASTWARD. MANY DOTTED CAÑON WRENS LIVED ABOUT THE BUILDINGS IN THIS TOWN.

The verdin has pronounced ideas as to the specifications of the plant in which it builds. On the eastern slope of the mountains there are two quite distinct forms of cholla. The smaller of these is yellow. It is compact and does not easily fall to pieces and the cattle do not feed upon it. This is, almost without exception, the only cactus the birds will use throughout the region about Santa Rosalía. Farther west, where that type of cholla becomes rarer, they are perfectly willing to accept the other variety. The mesquite, too, must fulfill certain requirements. Nine times in ten it will be a bush of from five to eight feet in height, with at least one stout sprout running well toward the top. The wreckage of old nests shows that individual pairs adhere uniformly to one type of vegetation.

The nest of the verdin is set upon the upper parts of the plant. If in cholla it is seldom so situated that a broken piece could fall upon it. There is no necessity for concealing it from enemies; even in a jay infested country it perches conspicuously

in the open, yet safe against hostile raids. If in mesquite the nest is normally as near the top of the bush and as far outside the main foliage as the strength of supporting limbs permits.

When nest building begins both birds work industriously. They find an arrangement of cholla stems in which it is possible to construct a suitable circle about five inches in diameter. They build one of fine weed twigs or of grass stems which often have leaves still attached. These inch-long bits are fastened to the cactus with a layer of plant down, the bird standing within the rim and tucking in the material with a most business-like air. The next step carries the outside super-structure backward from the ring to supporting arms of cholla. The frame is of the same material as the original circle. The builders continue to work from the inside and soon the frame becomes a shell. That, in turn, is added to and padded until a thickness of perhaps half an inch is reached.

The result is a flexible nest. In marked contrast to those of Arizona and particularly the Vizcaíno Desert and Sonora it is hardly ever protected on the outside with reinforcement in the shape of thorns or larger twigs. The lining of the nest is dependent upon the preferences of individuals. Ordinarily the feathers of larger birds are used, those of quail or doves being quite typical. Near farms chicken feathers are in demand. Sometimes plant down is substituted, or even raw cotton gathered from the bolls. The lining is, ordinarily though by no means always, profuse. It may include the entire chamber to a thickness of half an inch, or it may be limited to a small deposit in the bottom.

The opening to the hollow globe is completed last. It is left just large enough to permit the entrance and egress of the parents and it is so placed as to face away from the plant on which the nest is built. It is almost level with the bottom (only once did I observe a hole squarely in the center), and it is often somewhat concealed with an overhang of building material. The interior design permits of the low entrance being safely used. The tunnel runs upward. At the interior end the wall of the nest drops abruptly or even outwardly. So the eggs lie directly below the entrance. It is interesting to note that this is not true of the nests of any other race of verdin.

Verdins have a long breeding season. They are among the first birds to lay, and they continue, with an apparently increasing frequency, throughout the season. We found their eggs in the middle of March, and there were many fresh sets when we left, the middle of June. The number laid is definitely not more than three; I have seen but one set of four out of a hundred examined. Clutches of three outnumber two in a ratio of approximately four to three. Incubated singles comprise about ten per cent of the total.

Eggs of the Cape Verdin run through a wide range of sizes, shapes and colors. Many are half again as large as the average and many are fifty per cent smaller. There is the elongated type, one end almost a hemisphere and the other a cone-shaped point. On the other hand it is not rare to find them as perfectly elliptical as the typical hummingbird egg. The ground color is green, the markings gray—facts established for us by an oculist with the proper instruments. The shade of green varies until almost blue is reached.

Poliophtila melanura margaritae. Santa Margarita Black-tailed Gnatcatcher. Widely spread and decidedly common. There was no association and no region where the presence of a pair of these little scolds could not be expected. They were most plentiful west of José María Cañon. They seemed equally at home in the thickest

brush and on the most open plains. Yet we found only five occupied nests and were able to save but one set of eggs.

The nests are cups, rather thin and quite deep. They are so extremely neat and trim and blend so well into the background that it is difficult to see them, the first time. They are usually placed in the center of some sage-like bush about three feet from the ground. They rest on both a lateral and a horizontal branch. One exceptional site was the heart of a mistletoe in a mesquite, well hidden by the parasite, at a height of twelve feet.

Fresh eggs are most numerous about the middle of May, and the season is exceptionally short. The number in a clutch, within our limited experience, was three.

San Diego, California, September 8, 1929.

NOTES ON THE AVIFAUNA OF A TRANSITION ISLAND IN NAPA COUNTY, CALIFORNIA

By HAROLD W. CLARK

Brief mention has been made in the past (Mailliard, Proc. Calif. Acad. Sci., ser. 4, ix, no. 10, pp. 273-296) of the existence of a small Transition-zone area on Mount St. Helena in Napa County, California. From studies which the writer of the present paper has been making for five or more years, it seems evident that an extension of this zonal area ought to be made. A list of the trees, shrubs, and herbaceous plants, with the birds found along the Napa Range from Mt. St. Helena southeast to the vicinity of Conn Valley east of St. Helena, contains so many typical Transition species that we are of the opinion that a good share of this region ought to be considered as belonging to the Transition life-zone—the only large area of this zone in Napa County. This list includes 15 trees and shrubs, 8 flowering plants, 12 strictly Transition birds, and 13 birds that range in both Transition and Upper Sonoran.

Southeastward from Mt. St. Helena, the range is broken. Several old cones and volcanic "necks" rise to about 3000 feet altitude, and on the west side extensive cliffs of columnar andesite, the "Palisades", over 400 feet high, overlook Calistoga, 2000 feet below. The soil on this ridge is largely disintegrated lava, with much rotten tufa. The cañons have cut deeply into the east side from Pope Valley, and up these cañons, on the south-facing slopes have come several Upper Sonoran types, blue oak (*Quercus douglasii*), digger pine (*Pinus sabiniana*), chamise (*Adenostoma fasciculatum*), and many of similar habitat preferences. Among these trees and shrubs may be heard the notes of such common birds as the Wren-tit (*Chamaea fasciata henshawi*), Plain Titmouse (*Baeolophus inornatus*), California Jay (*Aphelocoma californica*), and the Sonoma Thrasher (*Toxostoma redivivum sonomae*). But on the north-facing slopes and the damper and cooler areas are abundant stands of cañon live oak (*Quercus chrysolepis*), black oak (*Quercus kelloggii*), tan oak (*Lithocarpus densiflora*), and Douglas fir (*Pseudotsuga taxifolia*). Big-leaf maple (*Acer macrophyllum*), dogwood (*Cornus nuttallii*), hazel (*Corylus rostrata californica*), incense cedar (*Libocedrus decurrens*), and redwood (*Sequoia sempervirens*) are fairly common also. On the higher portions of the range the madrone (*Arbutus menziesii*) grows in dense stands along with some black oak and yellow pine (*Pinus ponderosa*).

Directly east of Calistoga one reaches Three Peaks (3300 feet), the highest point between Mt. St. Helena and the Bay. Below, Howell Mountain lies spread out, a volcanic plateau whose rim is about 1800 feet high, with a depression 200 feet depth in the center which appears to be the remnant of an ancient crater. Around the north and east sides of this plateau, and covering most of the eastern two-thirds of the mountain, is a distinct Transition area. Omitting the incense cedar, the same species noticed north of Three Peaks flourish here in abundance; and with the exception of a few scattered redwoods, the heavy forest shows the characteristics of the tan oak-Douglas fir Transition of northern Lake County and Mendocino County. In the damper ravines are to be found *Trillium sessile chloropetalum*, *Trillium sessile giganteum*, *Asarum caudatum*, *Aralia californica*, and *Symphoricarpos racemosus*. Stream beds are full of *Rhododendron occidentale*. Rocky slopes are made beautiful by tall sprays of *Heuchera micrantha*; and the dry uplands under the yellow pines glow in the spring time with *Viola lobata*. Occasional clumps of

Prunus demissa and *Ceanothus thyrsiflorus*, and now and then beds of *Fragaria californica* and *Whipplea modesta*, add a distinctly Transition effect to the forest.

The following strictly Transition avifaunal representatives are to be found in various habitats offered by this forest.

Oreortyx picta. Mountain Quail. Occasionally heard in the wilder parts of the region. One or two flocks have come onto the campus of Pacific Union College, which is located in the ancient crater mentioned above.

Glaucidium gnoma grinnelli. Coast Pigmy Owl. Common around gardens and orchards and in the forest.

Dryobates villosus hyloscopus. Cabanis Woodpecker. Fairly common resident among the oaks and in fir woods.

Phloeotomus pileatus abieticola. Northern Pileated Woodpecker. Workmen on Dr. Wm. F. Bade's wild life refuge on the north side of Howell Mountain have reported this woodpecker several times; and during the spring of 1929 two or three were seen by several observers, including the writer, on or near the College campus.

Selasphorus alleni. Allen Hummingbird. Common summer resident, often seen around the flowers in gardens.

Cyanocitta stelleri frontalis. Blue-fronted Jay. Abundant in coniferous woods throughout the whole region.

Piranga ludoviciana. Western Tanager. Although not commonly known, nesting birds have been found, and the call notes are frequently heard.

Dendroica auduboni auduboni. Audubon Warbler. Abundant resident among the black oaks and partly open forests of the whole area.

Vireo solitarius cassinii. Cassin Vireo. Abundant among the cañon live oaks and in the deeper woods and cañons.

Sitta pygmaea pygmaea. Pigmy Nuthatch. Occasionally seen and heard, and at least one flock of young birds recorded. During the summer of 1926, this flock came regularly to drink from a dripping faucet in the writer's garden.

Penthestes rufescens rufescens. Chestnut-backed Chickadee. Erratic flocks come and go at all times of the year, and it is probable that they breed in the deeper forest areas.

Turdus migratorius propinquus. Western Robin. Abundant resident on Howell Mountain, nesting in numbers on the campus of Pacific Union College. One nesting bird raised two broods in a madrone tree within twenty feet of where workmen were building an annex to the ladies' home. Directly beneath the nest was a motor and power saw, but the bird appeared to be undisturbed by the noise and the men at work. In the winter these birds gather by hundreds in the orchard.

In addition to the above strictly Transition species, the following birds are common or abundant, whose range is at least partly Transition.

- Valley Quail (*Lophortyx californica vallicola*)
- California Coast Screech Owl (*Otus asio bendirei*)
- Red-shafted Flicker (*Colaptes cafer collaris*)
- Western Flycatcher (*Empidonax difficilis*)
- Olive-sided Flycatcher (*Nuttallornis borealis*)
- Brewer Blackbird (*Euphagus cyanocephalus*)
- Chipping Sparrow (*Spizella passerina arizonae*)
- Spotted Towhee (*Pipilo maculatus*)
- Black-headed Grosbeak (*Zamelodia melanocephala capitalis*)
- Western House Wren (*Troglodytes aëdon parkmanii*)
- Golden Pileolated Warbler (*Wilsonia pusilla chryseola*)
- Lutescent Warbler (*Vermivora celata lutescens*)
- Bush-tit (*Psaltiriparus minimus*)

In view of these facts, from both the flora and avifauna of the region, it seems as if we ought to recognize a strip of broken Transition from Mt. St. Helena to Three Peaks, and then an area of about twenty square miles covering most of the top and nearly all the upper part of the northern and eastern sides of Howell Moun-

tain as far south as Pine Crest, east of Conn Valley. In this region are many interesting and important problems relating to the distribution of the life north of San Francisco Bay, and in the relation between the Bay, North Coast, and Sacramento Valley faunal districts.

Pacific Union College, Angwin, California, July 24, 1929.

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METHODS OF TRAPPING BIRDS

By ERNEST D. CLABAUGH

Because of the scarcity of literature on bird-trapping methods, it has seemed proper to assemble the experiences of successful banders of the Western Bird Banding Association. Questionnaires were sent to these members, and the data received in response thereto are presented in the present article. Analysis of these data indicates that baits and methods used in one region are often unsuccessful in another; hence, any method herein recounted may fail in localities other than the one where it has proven successful. All traps mentioned have already been described in some paper on banding, either in publications of the Biological Survey or in the columns of *The Condor*.

Some banders broadcast bait in a new locality to attract the birds before setting traps. This is not necessary for some birds or in some localities. Some say that if birds become wary, then broadcast feed for a day or two without trapping. Very few banders scatter much feed outside of the trap, and most of them place the feed on the floor of the trap.

Most birds will enter the traps more readily if they are placed under trees, or near standing shrubbery or piles of brush. The latter are always drawing points for birds. Quite often birds will flock to the traps for feed between showers on a rainy day or on the day following a shower. The placing of the trap on a floor and directly on the ground have proven equally successful.

Unless otherwise stated in the text, Warbler and Water traps were used without other bait than water in them. A water drip seems to draw more attention than water in a dish.

Valley Quail. Easily trapped in most any type of trap, but only at irregular intervals. Most successful baits are cracked corn or scratch-feed. Trapped in any locality where found, either in the open or in deep brush, and generally in the early morning.

Mourning Dove. Very few data have been obtained, but some doves were trapped in Colorado at an altitude of 8200 feet by means of Potter, Sparrow, and Drop traps, using wheat for bait.

Sharp-shinned Hawk. One of these was captured in a Water Trap, using a dead bird as bait.

Gila Woodpecker. Captured in the foothills of southern Arizona by means of a Potter Trap baited with cracked corn and bread crumbs.

Jays. Many kinds of jays have been captured at altitudes ranging from sea level to 8200 feet. California Jays are captured mostly around urban communities, in back yards, or in natural growths nearby. Place trap near shrubbery and bait with chicken-feed, broken walnuts, chunks of bread, sunflower seeds, or acorns. I have found scraps of bread very good, while the other baits have been successful in other localities. This jay will enter any of the common traps, and at almost any hour of the day.

Blue-fronted Jays are captured mostly at high altitudes, some as high as 7500 feet. The traps were set near a cabin, both on the ground and on a feeding table, and Potter and Funnel traps were used. Baits used were kitchen scraps, suet, and chick-feed. These jays seemed to visit the traps best in the early morning hours, but some were captured at all times of the day. Suet and fat seemed best when the weather was cold or a storm brewing. Most of the captures were young birds, and there were few repeats. One bander in the mountains was only able to capture them from August 1 to August 25, nothing attracting them after that date.

Long-crested, Woodhouse, and Rocky Mountain jays were captured in the early morning at 8200 feet altitude in Colorado with Drop, Sparrow and Potter traps, by baiting with wheat, meat scraps, or cracked corn.

Rocky Mountain and Black-headed jays were captured in British Columbia in House and Figure-4 Drop traps, by baiting with meat, suet, table scraps, feed oats and small raw potatoes. The best catches of Black-headed Jays were made when they were concentrating for migration; of Rocky Mountain Jays, in the cold of spring or fall.

Nutcracker. Captured in cabin yards in the mountains at altitudes of from 7000 to 8200 feet. Traps used were Potter and Funnel set either on ground or on table. Suet and meat scraps were used in winter, and bread in summer. Weather had no effect on their visits.

Blackbirds. The only captures of Brewer Blackbirds reported were in yards or parks in the cities. Sparrow and Potter traps were responsible for most of the captures, but Warbler Traps caught some, when the birds came to drink after eating. Baits used successfully were chick-feed, bread crumbs and walnut meats, and the birds were caught at any time of the day.

Red-winged Blackbirds were captured at 7300 feet altitude by the same methods, but only for short seasonal periods: at one station from February 26 to March 10. Males were captured first, females a month later, and all left as soon as the ice melted on the marshes.

Orioles. Both Arizona Hooded and Bullock orioles were captured in yards in city lots, but plenty of shrubbery was a prerequisite. One bander says to have trap set where bird can hop from twig to trap. Most of the birds have been caught in Water Traps, some placed in the open, others under dense shrubbery, on the ground or on elevated platform. However, orioles have been caught with a Potter Trap. The birds seem to come to the traps any time during the day. Another bander reports having captured only immature birds. Baits other than water that have attracted orioles are water-melon pulp, small grapes, jelly, and oranges when cut open. Where water was used it was allowed to drip into a dish in the bottom of the trap.

Evening and Pine Grosbeaks. Both of these birds were trapped in British Columbia in a clearing in the pine woods. Salt was sprinkled on an exposed dirt bank and was washed in by the rains. The birds were then caught in a Drop Trap placed over this salty ground. Seeds or cereals did not attract these birds, but one bander in Idaho caught many Evening Grosbeaks in spring with sunflower bait.

Linnet and Purple Finch. These birds have been trapped in various locations, and the methods used by individuals have been different. Traps have been set under bushes, in the open, on the ground, and a short distance above the ground. All kinds of traps such as the Potter, Clover-leaf, Sparrow, Drop, and Warbler have been used successfully by different persons. Some were successful for one person but were not a success when used by another. The early morning seems to be the best time for trapping finches, although some visit the traps in the late afternoon.

The baits used by various banders were bird-seed, chick-feed, broken walnuts, hemp, sunflower seed, oat groats soaked, white bread, and dripping water. Some people have been able to attract finches with water alone.

Cold winters are reported the best for Purple Finches, and sunflower seed the best bait. At one foothill station, water seems to be the only bait that will attract Purple Finches.

Crossbill. The only captures of Crossbills have been from the pine woods of British Columbia. Here, Drop Traps were set over places where there was salt, cement or clay, some being placed on shelves of a cement chimney. The salt baits must be developed, and the catch increases from year to year. Captures were reported only during the winter and early summer.

Rosy Finches. In Colorado, at an altitude of 8200 feet, the Gray-crowned and Hepburn rosy finches were captured during or before storms, in November and December. They fed in flocks on the south-facing hills where the snow had melted. A Drop Trap was used and baited with bird-seed, wheat, and bread crumbs, some being scattered outside the trap. If the trap was placed where the birds happened to alight, they were easy to capture, and the trap would be filled at once. After the storm had passed the Rosy Finches disappeared.

In British Columbia, Rosy Finches were captured only in the spring, when it was wet and cold. All traps used were ground types baited with cereal and canary-seed.

Redpoll. Reported from British Columbia, where captured only when driven to baited traps by bad spring weather. Ground traps were used, baited with cereal and canary-seed.

Goldfinches. Willow and Green-backed goldfinches were only captured by using water as a bait. Both the Warbler and Potter traps were used, generally with water dripping into the trap in some manner. It is well to set trap near some seedling annuals such as cosmos or coreopsis.

Pine Siskin. In British Columbia these birds were captured in Sparrow Traps set over clay banks that had been salted. The only other bait that they would take was growing garden truck. In Altadena, California, they were captured in Drop Traps that had a spray of water falling into a dish.

Alaska Longspur. The only record of the capture of this species by trapping was furnished by Mr. T. T. McCabe, of British Columbia. In September, 1926, a premature snow storm drove in the longspurs in large numbers. Drop Traps were set in front of them as they advanced, feeding, across a clearing. Sparrow Traps were also used, baited with cereals and bird-seed.

Harris and White-throated Sparrows. Captured along with Gambel Sparrows.

Gambel, Golden-crowned, and Nuttall Sparrows. These birds are all trapped in the same manner, and are the easiest of all the birds to capture. They can be caught in the yard near shrubbery or piles of brush, or at any place where they are seen to flock in numbers. Move traps from time to time as birds are noticed to frequent different places. It is not necessary to scatter feed outside the traps. Baby-chick-feed, scratch-feed, bread crumbs and bird-seed seem to be the best baits. These birds can be captured in all the common kinds of traps indiscriminately, and best when on the ground. They will visit traps early in the morning, again around noon, and then late in afternoon. They will flock into traps on the day following a storm, and even between showers on stormy days.

Walking toward a flock, I have made some of the birds drift into a trap, then I have taken out the birds caught, and by circling around worked the flock back to the trap, and have successfully repeated the procedure several times.

Chipping Sparrow. These have been captured near a school building in a town, and near a mountain cabin surrounded by pines. Bread crumbs, chick-feed, and kitchen scraps were all very good, and can be used in Drop, False-bottom and Trip-treadle traps. Birds visited traps at any time of the day, but only when weather was fair.

Juncos. Sierra, Point Pinos, Thurber, and Shufeldt juncos can be caught in both the mountains and in the city, wherever they are noticed to be present, mountain meadows being especially favorable. Chick-feed, cracked corn, bread crumbs and bird-seed are all good baits for the Potter, Funnel, and Drop traps, and juncos will also visit Water Traps which have a drip inside. In the mountains they come to the baited traps after mid-August, and were captured in winter, even in the high mountains of California and Colorado, when there was snow on the ground and the food was scarce. In British Columbia they were caught during migration.

Song and Lincoln Sparrows. These birds are captured around homes and in cañons where there is plenty of underbrush. Set any of the common traps near cover and bait with bread crumbs, scratch-feed, or bird-seed. One bander reports catching them only when millet seed was used. They will visit traps during any period of the day. They are intelligent and soon learn how to get in and out of the Funnel and Sparrow traps without being caught.

Fox Sparrow. Birds of this species were reported from British Columbia as being caught only during migration. Potter and Funnel traps were used, baited with bird-seed. In the mountains elsewhere, Fox Sparrows were caught in Potter and Sparrow traps baited with cracked corn and bread crumbs.

Around the San Francisco Bay region, these birds were caught by setting any of the common ground traps under thick underbrush, and baiting with chick-feed. They were captured usually in the early morning hours; very few in the evening. They repeated frequently, one having been caught during three successive years of trapping.

Brown Towhee. These can be captured in gardens or in the wild wherever they are to be found. Traps give best results if placed on the ground near cover. The

birds seem to vary seasonally, as to number captured. They will go into any of the traps when baited with bread crumbs, chick-feed, rolled oats, or most any kind of bait, and can be expected at any hour of the day.

Spotted Towhee. Same as for Brown Towhee, except that they possibly frequent more dense growths than the latter.

Green-tailed Towhee. These birds were trapped in mountain environments, and are reported up to an altitude of 8200 feet. Traps generally were set near brush, and successful baits were chick-feed, cracked corn, bread crumbs, and bird-seed. Reports from the San Bernardino Mountains show them being captured from July to September only, and traps were set in the shade of small pines. Both the Potter and Sparrow traps were used. At an altitude of 8200 feet in Colorado, the trapping was very effective in winter during storms, but, in the San Bernardino Mountains of California, poor results were obtained during storms.

Black-headed Grosbeak. This Grosbeak has been captured in the city and in semi-settled regions. All ground traps and the Water Trap have been successfully used for capturing it, and best results have been obtained when the traps were set on the ground. The following baits have all been used with success: Water, sunflower seed, bread, oranges (cut open), and watermelon. The birds seem to visit traps at any time during the day.

Western Tanager. Reported as taken in Pasadena, California, with a Potter Trap set five feet above the ground near shrubbery, and with a Water Trap placed on the ground. Both traps had water dripping into them and were also baited with feed as for Linnets. It was, therefore, not determined just which of the baits attracted the tanagers.

This bird was also taken in the mountains at 10,000 feet altitude by means of a Potter Trap baited with scraps of bread, bits of fruit and lumps of brown sugar. It was only taken during fair weather.

Cedar Waxwing. Waxwings were captured by two banders, once by each, and the captures, according to the banders' own statements, seem to have been by mere luck.

Near Redlands, California, a catch was made by setting a Drop Trap over a small pool that remained from a dried-up stream. At first only one or two came down, and then the whole flock. Just one catch was made.

The other report was from Claremont, California, where the trap was set over a dish of water near walnut trees where birds alighted. They were only caught at one time, although they have visited the spot since.

Vireos and Warblers. Captures of most of the western vireos and warblers have been made near city homes with both the Warbler and Potter traps baited with a spray of water from bottom or a drip from top. The birds were captured either when traps were set on the ground or when about five feet above. Best results were obtained on cool, foggy mornings.

Most of the Audubon Warblers have been captured by means of the Water Trap, with water dripping into it or being sprayed into a dish. However, one bander reports having captured them in a drop trap baited with bread crumbs.

Long-tailed Chat. The only chats reported were by the Micheners in Pasadena, California, who caught three in a Warbler Trap, and three in a Potter Trap. The kind of bait which the birds took was undetermined.

Western Mockingbird. Easily captured where the species is common. A trap set near a pile of brush or shrubbery, where birds are seen to alight, will soon capture some of them. Some have been caught by means of the Water Trap, but mockingbirds will go into nearly any of the traps. Good baits consist of chick-feed, pieces of bread, cut oranges, walnuts, raisins, grapes, mountain ash berries, or a dripping faucet inside a trap. Young mockingbirds are much more easily trapped than the older birds.

Thrashers. For any of the western thrashers, the trap must be set under or near dense shrubbery. Any of the common traps baited with chick-feed, bread, seeds, cracked corn or small seeded raisins will catch them.

House and Vigors Wrens. Captured with traps and bait as set for Gambel Sparrows.

Nuthatches. Pigmy and Red-breasted nuthatches were only reported as cap-

tured from 10,000 feet altitude in California and 8,200 feet in Colorado. In California Slender-billed Nuthatches were captured on a feeding table in Pasadena, with Potter Traps and with a Tree Trap operated with a string. For nuthatches, the Tree Trap is open at the top, but for creepers it should be open at the bottom. Suet, bread crumbs and cracked nuts were used as bait, and the nuthatches were only caught when natural food was scarce. The Pigmy and Red-breasted were captured from December to May, and the Slender-billed from December to August. In Colorado nuthatches were caught in Drop and Sparrow traps with suet as bait.

Plain Titmouse and Mountain Chickadee. Birds of this family were captured in the Potter Traps baited with sunflower seed, nut meats and bread. They were reported as being very fond of piñon nuts. Best results were obtained with the trap on a platform. Two of the Plain Tits were captured by the writer in Potter Traps set on the ground baited with chick-feed.

The Plain Titmouse has been reported as being caught at an altitude of 7300 feet, but only when snow was on the ground. Potter and Funnel traps were set on a feeding table, baited with dried bread, suet, bacon and ham scraps, oatmeal and chick-feed. The bread was often soaked in grease. The fatty foods were taken on cold days, and the starchy ones on the warmer days. Captures were only made from December to May, when natural food was scarce.

Bush-tit. Bush-tits were caught in Water Traps with dripping water. A trap must trip very easily to react under the light weight of these birds.

Wren-tit. Easily caught by setting trap close to brush that the birds frequent. Any of the ground traps are good when baited with fine ground corn, chick-feed or bread crumbs. These birds are good repeaters.

Kinglets. Only reported as having been caught at Buena Park, California, in Water Traps.

Townsend Solitaire. No one has reported the capture of this bird, although attempts have been made with various kinds of baits and traps.

Thrushes. Dwarf Hermit and Russet-backed thrushes are easily captured where present, by placing trap near or under shrubbery that the birds are frequenting. Best results are obtained if trap is hidden. Use any of the common traps, baited with chick-feed, raisins, small grapes, strawberries, or bread crumbs. Water Traps are also used successfully. The thrushes most frequently visit the traps in the late afternoon.

In British Columbia, the Varied Thrush has been caught in Potter, House and Sparrow traps, baited with cereals, but only in the severe weather of spring and fall when snow was on the ground.

Western Robin. The only successful results have been obtained in the mountains, and these were with the Potter and Funnel traps, either set on the ground or on a feeding table. In the San Bernardino Mountains the birds captured were immature, were caught only from August 1 to 25, and the traps were baited with kitchen scraps. From the Sierra Nevada, the birds were reported as being captured from March until August, in traps baited with fruit, dead grubs, and bread crumbs.

Most banders report that all traps at all times have been completely ignored by the robins.

Berkeley, California, September 12, 1929.

AN ABNORMAL WING DEVELOPMENT IN A PINTAIL DUCK

WITH TWO ILLUSTRATIONS

By HILDEGARDE HOWARD

Note: In presenting the following case, it is the writer's aim merely to present the evidence as it was presented to her, coupled with the facts as she has observed them.

On September 27, 1929, Mr. Fisher C. Baily sent to the office of Mr. George Willett, Ornithologist of the Los Angeles Museum, a male Pintail Duck (*Dafila acuta*). Mr. Baily explained to Mr. Willett that the duck was a pet that had just died and that he thought the Museum would be interested in it because its left wing had been severed some time before and a new one had grown in its place. The detailed history of this bird as later told to Mr. Willett and the present writer is as follows.

About 17 miles northwest of Wasco, California, in the duck season of 1926, Mr. Baily had shot the duck, then adult. The shot broke the bird's left wing through the carpo-metacarpus. Mr. Baily wished to keep the bird alive, and prepared to doctor the badly broken wing. [From other remarks made during the course of the conversation, it would appear that this operation was not unfamiliar to Mr. Baily, since his interest in birds, as a hunter and bird bander, and in handling birds as pets, has necessitated similar operations at various times.] He first removed all of the feathers of the entire wing, leaving only a sparse covering of pin feathers. This, he explained, was to prevent any possibility of irritation of the wound by dirt collecting on the feathers. He then laid the bird on a table, spreading the wing out, and with a large hunting knife severed the wing through the broken portion, making a clean cut. He then cauterized the wound thoroughly with iodine.

The duck was brought to Mr. Baily's home in Los Angeles and kept with his other birds. It was fully a year later, Mr. Baily said, before he noticed any peculiarity in the bird's wing.

After Mr. Baily had joined the Biological Survey, in 1928, the duck was banded with no. 639448. At this time Mr. Baily made the following notation regarding the bird, in his report to the Survey: "Old Sprig Duck with broken elbow. Has grown a new elbow; old elbow still hanging. Only case known to any naturalist consulted." [Apparently the angle at which the new portion joined the old led Mr. Baily to the supposition that this junction represented an elbow, in addition to the true elbow which had never been removed.]

At the time it came into the possession of the Los Angeles Museum, the bird had been with Mr. Baily three years. At this time the abnormality of the wing was immediately noticeable in the angle at which the new portion joined the old (see fig. 21), and in the fact that the new part hung loosely upon the remainder of the wing. Mr. Baily remarked that the bird, when alive, had a habit of twitching this tip of the wing, although it was entirely useless in flight and could not be moved normally.

The new portion of the wing was about 102.5 mm. long to the tip of the longest feather. There were five partially developed primaries present; four other feathers of good size were present, but from their position, coloring and general appearance they were taken to be primary coverts. There were no primaries on the remaining portion of the wing, but two old and hardened quills, 10.6 mm. in length, showing evidence of having been cut, were noted.

The cut in the wing occurred through the carpo-metacarpus about 34 mm. from the carpal joint. This "stump" (see fig. 22, cc') could be felt protruding slightly behind and under the new portion of the wing.

The new and old portions were held together by means of tissue which was continuous, from one part to the other, in only two places, both on the upper side of the "stump", with a gap of 3.3 mm. between them. The most proximal connection (see fig. 22, a) measured 6 mm. in length (from bone to bone), the other, which was more distal and posterior in position (see fig. 22, b), measured 3.5 mm. Each connection was entirely lacking in cartilage or bony substance. The space between the connections was an evenly rounded hole entirely bounded by tissue.

The new portion of bone was held in place by these tissue connections, 4 mm. proximal to the end of the "stump", and above and toward its outer, or anterior edge (with the wing spread). (See fig. 22; dotted lines indicate "stump" lying under the new bone.)



Fig. 21. LEFT WING OF PINTAIL DUCK, VIEWED FROM ABOVE. ARROW MARKS JUNCTION OF NEW PORTION OF WING WITH OLD. APPROXIMATELY $\times \frac{3}{4}$.

Photograph by H. Wm. Menke.

The tissues were dissected away to reveal the bone.

On the "stump", 6.7 mm. proximal to the end, the bone was enlarged, showing signs of excess callus. Metacarpal III was joined to metacarpal II at this point, and a roughened area, 7.4 mm. long (see fig. 22, d), was present along the anterior edge of the upper side. The bone distal to this enlargement had a diameter of 3.8 mm. as against 4.6 mm. for a normal carpo-metacarpus in this region. According to Dr. Roy L. Moodie, who has made a study of pathological conditions in bones, and to whom the writer showed the bone in question, the condition noted here indicates atrophy.

With the outside tissue pulled away, a direct tissue connection from the tissue surrounding the new portion to the roughened area of the carpus was noted (approx-

mately as in *e* in the figure, though no attempt has been made to indicate that *e* lies beneath *a*). This connection occurred between the other two connections and at a deeper level, differing from them, also, in being attached solidly to the bone along the roughened area. It appeared at first to be about 1.8 mm. broad and 2.9 mm. long, and to be attached only to the lower end of this area. Upon attempting to dissect it away from the bone, however, it was found to be closely attached along the entire 7.4 mm. of the length of the roughened area. This connection, like the others, contained no bone or cartilage.

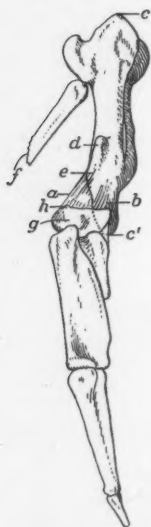


Fig. 22. CARPO-METACARPUS AND DIGITS OF THE LEFT WING VIEWED FROM ABOVE, SHOWING RELATIONSHIP OF NEW PORTION OF WING TO THE "STUMP". SEE TEXT FOR DETAILED EXPLANATION OF LETTERS. $\times 1$.

Drawing by
John L. Ridgway.

Digit I attached to the "stump" showed signs of having been broken at the tip (see fig. 22, *f*).

The new portion of the wing was found to have digits II and III complete (phalanges 1, 2, and 3 of digit II and phalanx 1 of digit III) as well as what appeared to be the distal portion of the carpo-metacarpus (see fig. 22, *g*), though slightly abnormal in shape, measuring 9.7 mm. across by 3.4 mm. and 6.5 mm. in length (proximo-distally). This metacarpal bone was smoothly rounded proximally except for a small projection (see fig. 22, *h*), and showed no sign of excess callus. It was set at an angle to the digits, leaving a space 3.6 mm. high between it and the proximal end of digit II at the anterior edge, and forcing the phalanx of digit III to a position 1.7 mm. distal to the normal. The metacarpus and the adjacent phalanges were all held rigidly together. In form and size the phalanges were normal and similar to those of the opposite side of the same bird.

SUMMARY

1. The wing was broken by shot.
2. Before the wing was cut, the feathers were removed.
3. The wing was severed with a large knife.
4. Three years had elapsed since the wing was cut.
5. There was no bone or cartilage connecting the two parts of the wing.
6. The end of the "stump", completely surrounded by tissue, protruded beneath and posterior to the new part of the wing.
7. The tissue of the new portion was continuous with that of the old in only two places, both on the upper and outer side of the "stump", and separated from each other by a hole 3.3 mm. in diameter.
8. At a deeper layer the tissue in this region (see 7) was attached to an abnormal ridge appearing on the "stump".
9. Digit I appeared to have been cut at the tip.
10. The "stump" showed signs of excess callus.
11. The new portion of metacarpus showed no signs of excess callus.
12. The new metacarpus was slightly abnormal in shape, and was set at an abnormal angle on the digits.
13. The metacarpus and adjacent phalanges were held rigidly together.
14. A small point of bone was present on the otherwise smooth proximal surface of the metacarpus.
15. Digit III was closer and more firmly attached to digit II than normally.
16. In number, shape and size the phalanges were normal and similar to those of the opposite side.

To the writer's knowledge there has never been a reported instance of regeneration of bones in the class Aves. Considering the close relationship of birds with reptiles, however, we cannot flat-footedly deny the possibility of such an occurrence.

In the case at hand we admittedly have only Mr. Baily's assertion that the end of the wing was removed. If the reader, however, could have opportunity of conversing with Mr. Baily, he would be convinced of the absolute sincerity with which Mr. Baily makes this assertion.

Los Angeles Museum, October 14, 1929.

A FOSSIL CRANE FROM THE PLIOCENE OF KANSAS

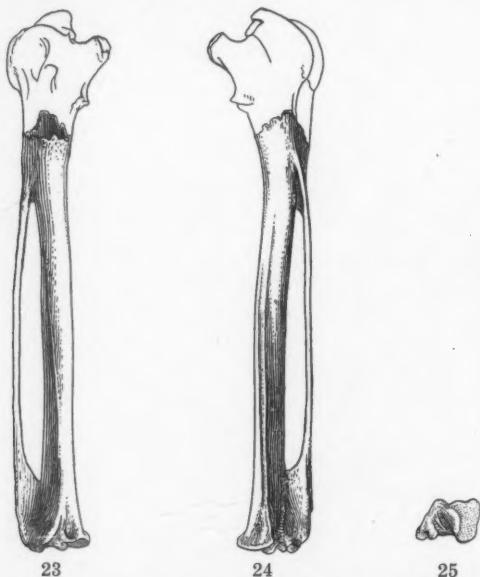
WITH THREE ILLUSTRATIONS

By A. WETMORE and H. T. MARTIN

Among vertebrate remains obtained by H. T. Martin during excavations in the Pliocene deposits of Sherman County, Kansas, there is the broken metacarpal of a crane that is allied to the living Sandhill and Little Brown cranes but that is obviously different. A description of this interesting bird follows. Drawings illustrating the type specimen have been made by Mr. Sydney Prentice.

Grus nannodes, sp. nov.

Characters.—Similar to the living *Grus canadensis* (Linnaeus)¹ but decidedly smaller, being less than two-thirds as large.



Figs. 23 and 24. TWO VIEWS OF TYPE SPECIMEN OF *Grus nannodes*, NATURAL SIZE. THE RESTORATION OF THE UPPER END, MISSING IN THE FOSSIL, HAS BEEN MADE FROM A SPECIMEN OF *Grus pratensis*, U. S. NAT. MUS. NO. 19019.

Fig. 25. DISTAL VIEW OF END OF TYPE METACARPUS OF *Grus nannodes*, NATURAL SIZE.

Description.—Type (figs. 23 to 25), no. 3757, Univ. Kansas Mus. Vert. Paleont., fragmentary left metacarpus with the proximal end lacking, collected in July, 1924, by H. T. Martin. Conformation of bone practically identical with that of the living Little Brown Crane; tuberculum ulnare and tuberculum radiale projecting to the

¹ *Ardea canadensis* Linnaeus, Syst. Nat., ed. 10, vol. 1, 1758, p. 141. (Hudson Bay.) This is the Little Brown Crane.

same level; the first with distal surface flattened, rather wide, curving slightly in lateral outline, somewhat broader externally than internally; the tuberculum radiale cut away at the sides so that it stands out as a distinct projection on its external margin, the margin toward the ulnar tubercle being marked by a slight pit; fornx metacarpi a broad, flattened plate with slightly curving surfaces, thin proximally and slightly thickened distally; third metacarpal straight and strong, somewhat flattened from above downward toward the distal end with a strongly marked sulcus tendini musculi on its external face, that is found as a depression for half the length of the bone, with sharply raised sides at its distal end; a slight muscular tuberosity near anterior end of the third metacarpal on the margin of the fissura metacarpi; fourth metacarpal a thin plate, flattened from side to side at its proximal end, narrowing distally to become flattened in the vertical plane at the fornx metacarpi, extending thus for a short distance almost as a knifelike edge; only the extreme distal end of the second metacarpal present.

Measurements.—Length from proximal end of fissura metacarpi to distal end of bone, 60.5 mm.; depth of proximal end just anterior to base of second metacarpal, 7.4 mm.; greatest depth of distal end of bone, 11.1 mm.; lateral diameter of shaft of third metacarpal near center, 5.6 mm.

Discussion.—The living gray cranes of North America are separated into two groups, the Little Brown Crane, *Grus canadensis* (Linnaeus), and the Sandhill Crane, *Grus pratensis*. Whether these two are specifically distinct or are subspecifically related is a matter of present-day controversy that does not require discussion here since there is no question but that two distinct kinds, whether they be species or subspecies, are found. *Grus nannodes* here described, so far as the specimen in hand is concerned, is identical with these two living forms in contour and sculpture, the basis for difference being entirely that of size. Apparently it was even relatively smaller than the Little Brown form than that bird is less than its large cousin the Sandhill Crane. The fossil bone is from a fully adult individual, so that there is no question as to its characters with regard to age. The finding of this species is particularly interesting in view of the recent record of a humerus identical with that of the living Sandhill Crane from the Pliocene of the Upper Snake Creek formation in Sioux County, Nebraska.²

With the fossil species *nannodes* and the living bird *pratensis* represented in the Pliocene of Nebraska and the living *canadensis* known from the Pleistocene asphalt beds of Rancho La Brea and McKittrick, California, one is led to suppose that there may have been three sizes among these birds in existence at the close of the Tertiary.

The type specimen of *nannodes* is heavily fossilized and is blackish slate in color, lighter at the extremities. In general appearance it resembles specimens of similar age from Sioux County, Nebraska.

Following is a partial list of the associated mammalian fauna with which the crane here described was found:

Rodentia	Perissodactyla
Mylagaulus sp.	Aphelops
Sciurus sp.	Hipparion
Carnivora	Pliohippus
Pseudaelurus	Artiodactyla
Machairodus	Prosthennops serus
Aelurodon	Prosthennops crassigenis
Borophagus cyonoides	Procamelus
Brachypsalis marshalli	Pliauchenia
	Dromomeryx?
	Blastomeryx

Of further interest was the discovery in a limited area fifteen feet by twenty feet, in the middle of the Pliocene exposure concerned, of the disarticulated skeletons of more than one hundred specimens of a new species of amphibian, *Plioambystoma kansensis*.

Washington, D. C., and Lawrence, Kansas, November 13, 1929.

² See Wetmore, Amer. Mus. Nov. No. 302, February 29, 1928, pp. 1-4.

FROM FIELD AND STUDY

Notes on Winter Bird Roosts.—During January and February, 1928, small flocks of from eight to twenty Lawrence Goldfinches (*Spinus lawrencei*) were common about my home on the outskirts of East San Diego, California. These birds were to be seen daily feeding on the seeds of the greasewood (*Adenostoma fasciculatum*). Some fifty or more roosted nightly in a large clump of lemonadeberry bush (*Rhus integrifolia*) in the center of a grassy patch in a nearby canyon. They were flushed from this bush at dusk and also at dawn on several occasions.

During the first two months of 1929 not even one Lawrence Goldfinch was seen in our neighborhood, but we had other bird visitors. Whenever I visited the canyon at dusk I saw flock after flock of Western Robins (*Turdus migratorius propinquus*) and Cedar Waxwings (*Bombycilla cedrorum*) coming from the direction of San Diego and alighting in the bushes. After some flying back and forth they settled down for the night, chiefly in the large clumps of lemonadeberry bush, laurel-leaved sumac (*Rhus laurina*), toyon (*Photinia arbutifolia*) and holly-leaved cherry (*Prunus ilicifolia*), and in the thickets of scrub oak (*Quercus dumosa*). At dawn, hundreds of these birds were to be seen in the canyon until about sunrise when flock after flock would head back toward the city. These two species were common in the city during the day wherever berry-bearing shrubs or trees afforded them food. I was at a loss to understand why these birds should leave the partial safety of the city with the excellent and secluded roosting places available in Balboa Park for the low brush of this canyon where they were far more open to attack by bird and mammal predators. I found the remains of several that had been killed, and I also found two robins that must have been shot by rabbit hunters.

During this same period and about a mile from the canyon where the robins and waxwings roosted I often saw Black-crowned Night Herons (*Nycticorax nycticorax naevius*) at sunset winging their way over the business section of East San Diego. After watching them on several evenings I finally saw them leaving a cluster of eucalyptus trees in a yard just a block and a half from one of the most traveled streets in the city and on the very edge of the business section. Without doubt these birds spent their days in these trees from which they were seen to emerge on several subsequent evenings and then wing their way toward the open country. Aside from small ornamental pools in yards, the nearest water containing fish was at least a mile and a half distant. Three immatures seen on February 14 were the most seen at one time, but a few evenings later a beautiful adult was seen to leave its roost in a Monterey cypress not more than fifteen feet above a sidewalk in the residential section. On another occasion, an immature Night Heron was seen to alight in a yard near a little pool where Pacific tree frogs (*Hyla regilla*) were singing, but it was immediately frightened away by the movements of a woman working among the flowers in the same yard. In spite of the large size and conspicuous appearance of these birds and the loud "qwonks" which they frequently uttered in flight, no one except myself, so far as I could observe, noted their presence in the city.—FRANK F. GANDER, O'Rourke Zoological Institute, Balboa Park, San Diego, California, August 15, 1929.

Least Bittern in California in Winter.—A female Least Bittern (*Ixobrychus exilis*) was taken by R. B. Moran at Sunset Beach, Orange County, California, December 10, 1927. The bird was brought to me in the flesh by Mr. Moran, who donated it to the museum. It was mounted and is now no. 14400, collection Los Angeles Museum.—G. WILLETT, Los Angeles Museum, October 31, 1929.

A Gull with Feathered Feet.—The presence or absence of feathers on the feet of birds is usually regarded as of generic value. Single or straggling feathers are occasionally present on the feet of species that are normally quite bare; and such feathers have been noted by the writer on the feet of such diverse species as a Gyrfalcon and a Pileated Woodpecker. A very notable instance is the feathered tarsi of a Western Red-tailed Hawk (*Buteo borealis calurus*) in the National Museum of Canada at Ottawa.

The persistent little bunch of feathers above the hind toe in the Bank Swallow (*Riparia riparia*) is a case where a peculiarity has become permanent. This feature is not present in any other species of this genus. But a regular series of feathers on the tarsus and middle toe of each foot in a water bird is a notable freak. Such a condition exists in a juvenile gull, *Larus glaucescens*, taken by Mr. Arthur Peake at Nanaimo, Vancouver Island, on September 19, 1929.



Fig. 26. FOOT OF YOUNG *Larus glaucescens*, SHOWING FEATHERS ON TARSUS AND TOES; FEMALE, DEPARTURE BAY, BRITISH COLUMBIA, SEPTEMBER 19, 1929.

On the outside of each tarsus are nine or ten well developed feathers, and on the first joint of the middle toe there is a similar number of poorly developed feathers; those on the tarsus are smoke gray, on the toes somewhat paler. The longest feather is 27 millimeters long. Mr. Peake has kindly donated the specimen to the writer's collection. It is otherwise notable in being a good example of the very dark phase of the juvenile of this gull, as dark as the darkest individuals of the Herring Gull, *Larus argentatus smithsonianus*; but the primaries and rectrices are dark sooty gray instead of black. The underparts, however, are darker than in any of the large gulls.—ALLAN BROOKS, *Okanagan Landing, B. C., November 9, 1929.*

Miscellaneous Notes on some British Columbia Birds.—*Larus hyperboreus*. Glaucous Gull. On January 14, 1928, while on the wharf at Okanagan Landing, the writer watched a Glaucous Gull for half an hour at distances varying from thirty to fifty feet and was thoroughly satisfied as to its identity. This was an immature bird in the creamy white plumage of the second year. It was in attendance on a flock of coots that were engaged in diving for apple parings which had been thrown overboard from the steamer. When a coot rose to the surface with an apple paring hanging from its bill the gull immediately would leave the water and, with bill open and spread feet held downward, pursue the coot who meanwhile would be swimming in a straight line out of the flock. The apple paring held in the bill would be shaken several times and eventually swallowed before the clumsily pursuing gull could steal it. This happened again and again and only once was the gull successful. On this occasion it splashed into the water and seized the coot by the feathers of the back, whereupon the apple paring promptly changed hands, or rather, bills.

Pelecanus erythrorhynchos. White Pelican. On May 15, 1928, five White Pelicans were seen flying north over Okanagan Landing. This species is a scarce migrant in the Okanagan Valley but is said to occur regularly during migrations in the Nicola Valley, some fifty miles west. This would be the most likely route to the Cariboo country where the species has been reported breeding (in 1899 at Sucker Lake, twenty-five miles northwest of Quesnel, according to Brooks and Swarth). There is said to be a breeding colony at Anahim Lake, which is approximately one hundred miles southwest of Quesnel. This colony was reported in 1922 by a former game warden who patrolled the district.

Mareca penelope. European Widgeon. A male European Widgeon in immature plumage was taken in Haro Strait, near Bare Island, British Columbia, on January 3, 1929, by Mr. Walter Burton of Victoria, British Columbia. This specimen is in the writer's collection.

Querquedula cyanoptera. Cinnamon Teal. During the summers of 1927 and 1928 this species was much more common in the Okanagan Valley than has before been the case according to the writer's observations. Numbers of birds were seen on different dates at various points, from near the International boundary to the north end of Okanagan Lake; and many pairs nested in this region.

Chen hyperboreus hyperboreus. Lesser Snow Goose. Twelve Snow Geese were seen on Okanagan Lake near Okanagan Landing on April 26, 1928. Under close observation for some time these birds were relatively tame as they fed in the shallow water some forty yards from shore. To secure whatever was being sought on the lake bottom they reached down so far that only the tail and a small portion of the body was above the surface, this position being held by quick paddling with the feet. The Lesser Snow Goose is not a common migrant in the Okanagan Valley and flocks of this size are unusual.

Squatarola squatarola cynosurae. American Black-bellied Plover. Mr. R. A. Cumming of Vancouver, British Columbia, informed me that a small band of Black-bellied Plover spent the winter of 1926-27 on Lulu Island at the mouth of the Fraser River. Several specimens collected by Mr. Cumming at that time, and now in the writer's collection, are adults in winter plumage.

Aquila chrysaetos. Golden Eagle. In the afternoon of March 4, 1926, near Okanagan Landing, a cock pheasant came down-hill toward the lake flying faster than ever pheasant flew before, or so it seemed, with a Golden Eagle in close pursuit. The pheasant dashed into the brush by the lake shore, and the eagle, unsuccessful, put on the brakes, turned at right angles and continued slowly along the lake, flying low and obviously hunting.

Falco rusticolus (subsp.). Gyrfalcon. A dark, immature female taken near Vernon, British Columbia, on November 24, 1928, is in the writer's collection. This is the fifth specimen taken in the vicinity during the past two years.

Dryobates villosus monticola. Rocky Mountain Hairy Woodpecker. During the winter of 1928-29 a male Hairy Woodpecker frequently was seen feeding on Virginia creeper berries in competition with several Red-shafted Flickers. On one occasion the same bird visited an apple tree, attracted by a few apples that still clung to the bare branches. Standing crossways on a branch, in the ordinary position of a perching bird, he rapidly stabbed his bill downward into the top of an apple. After doing this several times he flew to another portion of the tree and repeated the performance.

Phloeotomus pileatus picinus. Western Pileated Woodpecker. On December 2, 1926, a Pileated Woodpecker was seen scrambling among the thick entwined branches of Virginia creeper that partly covered the walls of a house situated on the shore of Okanagan Lake. Here it remained for twenty minutes, busily picking off the fruit. Subsequently, during the month of December, it often was observed eating these berries at the same place and likewise at a vine-covered house half a mile distant. Sometimes it appeared at both houses on the same day, but more often only one house was visited.

Asyndesmus lewisi. Lewis Woodpecker. An increase of this species in the Okanagan Valley was noted in 1927 and 1928 and new nesting territories were colonized in various sections. Many times these birds were seen feeding on grasshoppers and Rocky Mountain crickets, which swarmed in the valley in the summers of these years. During the winter of 1928-29 this woodpecker was observed at various times near Vernon (December 5 and 7, 1928, February 21, 1929) and at Summerland, 60 miles to the south (December 23, 1928, January 19, 1929). So far as the writer is aware, this species has been recorded in winter from the interior of the Province only once before.

Phalaenoptilus nuttallii nuttallii. Poor-will. On June 16, 1928, near Okanagan Landing, a Poor-will was flushed from under a sage-bush and investigation revealed two young huddled together on the bare ground. These birds, about two days old, were well covered with down; dorsally the color is wood-brown, the lower surface vinaceous buff. In one specimen the entire crown is tilleul buff, much lighter than, and contrasting with, the back.

Otocoris alpestris. Horned Lark. A certain small area of open range close to Okanagan Landing is yearly occupied as a nesting ground by a few pairs of Dusky

Horned Larks, *O. a. merrilli*, which arrive usually during the first week in March. Here also at this time come migrant *O. a. arcticola* and an occasional *O. a. hoyti*. Thus, on March 6, 1926, *merrilli* was fairly common in pairs. The males sang from any slight eminence, usually a stone but sometimes a clod of earth. The motionless singers were hard to locate, the fine buzzing song seeming to have a ventriloquial quality. Or the song would come faintly from high in the air and might be traced to its author, a small speck against the blue sky. Flocks of *arcticola*, among them a few *hoyti*, as subsequent collecting proved, drifted past to alight somewhere beyond and disappear against a neutral colored background of withered grass. Two weeks later, Horned Larks were scarce, and on these grasslands were left only the usual few pairs of *merrilli*.

Corvus brachyrhynchos hesperis. Western Crow. In recent years few crows have wintered in the vicinity of Vernon, Okanagan Valley; but during January and February, 1928, a flock of 100 remained in the outskirts of this city, spending part of each day in a ten-acre field of golden bantam corn which had been stooked and left thus all winter. What with the crows and a lesser number of ring-necked pheasants feeding daily in this field, the snow-covered ground had the trampled appearance of a poultry yard. During January, 1929, crows again frequented this cornfield after the first snow storm. Earlier in the winter the species had not been seen in the vicinity.

Molothrus ater artemisiae. Nevada Cowbird. For several years previous to 1927, Cowbirds were scarce throughout the Okanagan Valley. In the summer of 1927 they became fairly common and in 1928 unusually abundant.

Agelaius phoeniceus nevadensis. Nevada Red-winged Blackbird. In the summer of 1927 the Red-wing population in the Okanagan Landing-Vernon district was so much larger than usual that the normal marsh-nesting areas seemed insufficient for their requirements. Colonies were found nesting in tall rye grass and in brush patches on an open hillside bordering Okanagan Lake. During the two years previous there had been a plague of grasshoppers and Rocky Mountain crickets and with this food the Red-wings fed their young. Possibly this unusual abundance of insect food during the nesting season had been responsible for an increase over the normal, and the surplus thus created was forced to pre-empt whatever territory nearest to their requirements was available.

Icterus bullockii. Bullock Oriole. Across the lake from Okanagan Landing is a steep, bare mountain, down which wind a number of narrow draws well wooded with black haw, choke-cherry, service-berry and mock orange. For the past three or four years this range has been closely pastured by sheep with the result that the native bunch grass is being killed out and, where this has happened, is replaced by a dense growth of *Bromus tectorum*, an introduced grass of no value as forage.

In this region during the summer of 1928 Bullock Orioles were noticeably more abundant than usual, nesting in all the wooded draws. In the autumn, after the leaves had fallen, it was observed that the number of nests was greatly in excess of normal and that with few exceptions these were made entirely from the thin yellow stalks of the grass referred to above and sheep's wool. Some, unusually large and compactly woven, are beautiful examples of oriole architecture. The whole exterior is composed of this yellow grass, and in the bare trees the nests are as conspicuous as so many straw-colored baskets. The sheep's wool is not woven into the outer fabric of the nest but is used entirely as a lining, and in some cases the bottom of the nest is felted to a depth of three inches, thus forming a warm inner purse of the softest possible material. Other nests are made almost entirely of sheep's wool into which are laced strands of horsehair and stems of the yellow grass.

It seems of sufficient interest to record how readily the orioles took advantage of, and so lavishly used, these two recently introduced materials, suggesting that the local increase of this species was due to an abundance of desirable and easily obtained nesting material.

Zonotrichia leucophrys gambeli. Gambel Sparrow. A bird of the year was seen at Okanagan Landing on December 7, 1928, and again on January 3, 1929. Winter records of this sparrow in the Okanagan Valley are unusual enough to be considered worthy of mention.

Tachycineta thalassina lepida. Northern Violet-green Swallow. A single bird

seen at Okanagan Landing on November 7, 1927, just before the first cold weather and snow of the year, constitutes a notably late record.

Lanius borealis. Northern Shrike. At Okanagan Landing, on January 20, 1926, during a snowstorm, a compact flock of Redpolls was seen high in the air milling about in peculiar fashion. Suddenly the disturbing cause was seen to be a Northern Shrike which kept circling around the flock with occasional dashes into the midst of the frightened birds. In these dashes the Shrike seemed to single out a bird and try to separate it from the flock. This maneuver was repeated several times while the flock spiralled upward, higher and higher, finally to disappear in the grayness of leaden sky and falling snow. The last object seen was the Shrike apparently still unsuccessful in his hunting.

Turdus migratorius propinquus. Western Robin. During September and October choke-cherries furnish a favorite food of Robins in the Okanagan Valley. On October 1, 1927, a flock of twenty or more, after feeding greedily on cherries, flew into the tops of a near-by group of tall cottonwoods. Shortly afterwards came a pattering noise on the ground below, resembling the sound made by hailstones. Upon investigation this sound proved to be caused by the voided cherry pits falling from a considerable height and striking the dry leaves below. After a week or so a large number of pits were scattered on the ground under these trees and later in the season these were eaten by Evening Grosbeaks!—J. A. MUNRO, Okanagan Landing, B. C., April 1, 1929.

Notes on the Habits and Plumage of Young Kaeding Petrels.—The presence of *Oceanodroma leucorhoa kaedingi* Anthony about Guadalupe Island, Lower California, Mexico, is to be expected, as there are but few records of its capture far from this region. Yet it is of interest to record that two of four specimens of this bird taken from the immediate or near vicinity of Guadalupe by the writer on the nights of September 27 and 28, 1929, provided considerable data of scientific value. Both were young birds, with natal down still clinging to their feathers, and presumably had not flown for more than a few hours. The short time that had elapsed between their departure from their nests and their capture seems obvious from two angles—first, the fact that dampness or contact with water removes the clinging down, as it is very absorbent; and secondly, that, in view of this fact, the birds at the time of their capture had probably never rested on the surface of the sea.

The first of the specimens here considered was secured about 8:30 on the

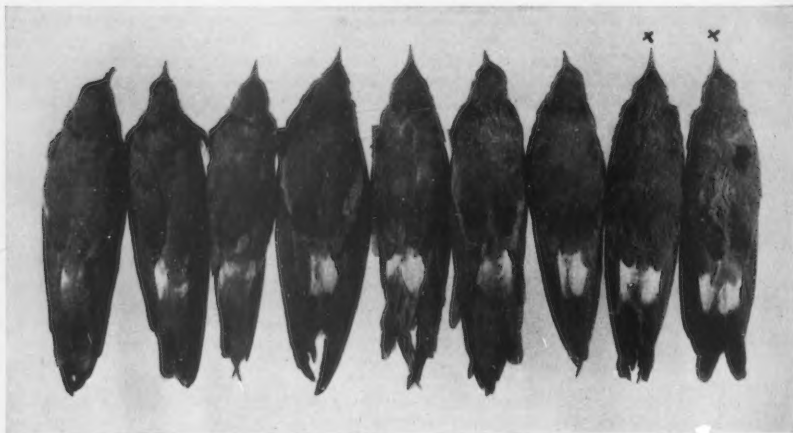


Fig. 27. SERIES OF KAEDING PETRELS SHOWING COMPARATIVE AREAS OF WHITE ON RUMP IN YOUNG (x) AND ADULTS.

evening of September 27, when it was attracted to the deck lights of the ship on which the writer was a guest. The ship was then at anchor about three-quarters of a mile off the Elephant Seal beach on the northwestern coast of the island. When this specimen first came into the hands of the writer, considerable natal down was still clinging to the feather tips. This down was extensively present about the head, hinder neck, back and flanks, with a slight sprinkling on the breast. In the course of preparation, however, nearly all the down was lost, excepting a large patch on the back.

The same condition prevailed as to the second specimen, though by far the heaviest area of down was on the flanks; in fact there was a greater amount of down over all. An unusual, or at least unexpected, feature in connection with the latter specimen was the point of its capture. The bird came aboard, in a decidedly fatigued condition, about 9:30 on the evening of September 28, when the ship was running directly from the island toward San Diego and was approximately 26 nautical miles off the north head of Guadalupe Island, making about 17 knots head speed. This distance from the island of its birth and the speed at which it must have been flying when coming aboard the ship seem phenomenal for a bird of this age. It is indicative of the arduous struggle of flight for which these nomads of the sea are prepared from the very hour they leave their nest.

The taking of these downy birds gives a clew to the approximate time of nesting of *O. l. kaedingi*, regarding which nothing has hitherto been recorded. Judging from knowledge of the time required for the development of *O. socorroensis*, gained on Los Coronados Islands to the northward of Guadalupe, it would seem that the eggs must have been deposited about the last of July. *Kaedingi* is most likely a crevice nester; for if it dwelt in burrows the feral house cats on the island would no doubt have exterminated it.

By far the most important fact discovered in the capture of these two young petrels was that the full complement of white rump feathers was attained in their first plumage. The writer made comparison with seven adult specimens of *O. l. kaedingi* and found that either of the two young birds here mentioned have as much white rump area as the adults, and in two cases even more—as may be seen in the illustration. It is therefore evident that at least in the race *kaedingi* the amount of white on the upper and lower tail coverts is not an index to their age, as was surmised by Oberholser (Proc. U. S. Nat. Mus., vol. 54, 1919, p. 172).—LAURENCE M. HUEY, *San Diego Society of Natural History, Balboa Park, San Diego, October 12, 1929.*

Chestnut-backed Chickadee in Lake County, California.—A male *Penthestes rufescens rufescens* taken by the late Walter Brett at Bergers Ranch, Lakeport, Lake County, October 20, 1893, is in my collection (no. 25669, coll. J. H. F.). Dr. Joseph Grinnell has confirmed the identification.—J. H. FLEMING, *Toronto, Ontario, October 13, 1929.*

A New Bluebird from El Salvador.¹—The eighteen specimens of *Sialia sialis* collected by the junior writer in El Salvador in the winter of 1925 and the spring of 1927 prove upon direct comparison with adequate series of the previously known races to be sufficiently distinct to deserve a name. The characters of this new race are outlined below.

Sialia sialis meridionalis, subsp. nov.

Type.—Male adult, no. 18400, collection of Donald R. Dickey; Los Esesmites, Chalatenango, El Salvador, C. A., February 22, 1927; altitude 8000 feet; collected by A. J. van Rossem; original no. 11263.

Subspecific characters.—Size, the smallest of all the races of *Sialia sialis*. Dorsal coloration of males identical with *Sialia sialis sialis* (Linnaeus) of the eastern United States; of the females brighter (but not lighter) blue, particularly on crown which is similar in color to the lower back; brown of the underparts of both sexes decidedly paler, close to "tawny" instead of "cinnamon-rufous" or "cinnamon-chestnut" in the

¹ Contribution from the California Institute of Technology.

² Ridgway, *Color Standards and Nomenclature*, 1912.

males. Compared with the geographically adjacent *Sialia sialis guatemalae* Ridgway, the size is very much less and the coloration slightly darker throughout, particularly on the underparts.

The measurements of the type, which, incidentally, are almost exactly the racial average, are, in millimeters: wing, 99.0; tail, 65.0.

Range.—Oak and pine regions of the Cordillera along the northern border of El Salvador.

Remarks.—It is a curious coincidence that this small new race in general resembles the common bluebird of the eastern United States more closely than it does that of the Guatemalan highlands which, conversely, is the largest of the known forms. The El Salvador bird is a permanent resident of, and is fairly common in, the oak and pine regions which cover great areas on the south slopes of the Cordillera between 3500 and 8000 feet. No trace of it was found in any part of the volcanic coastal range.

We are greatly indebted to the officials in charge of the collections of the Bureau of Biological Survey and the United States National Museum for the opportunity of examining all of the pertinent material in Washington.—DONALD R. DICKEY and A. J. VAN ROSSEM, Pasadena, California, October 16, 1929.

Some Notes on Point Reyes Birds.—On May 11, 1929, a White-tailed Kite (*Elanus leucurus*) was noted in the top of an oak in Lucas Valley. Lucas Valley is between San Rafael and Point Reyes, in Marin County, California.

On May 12, 1929, a nest of the Pigmy Nuthatch (*Sitta pygmaea*) was found on the ridge separating Tomales Bay from the Pacific Ocean. The elevation of the ridge at this point is about five hundred feet. We had stopped to investigate an old pine stub which showed several promising holes at various heights. As one of the boys was climbing past a small hole about seven feet above the ground a Pigmy Nuthatch flew out past his face.

The nesting site was opened up and was found to contain eight eggs. Unfortunately two of the eggs were broken when being removed, but the remaining six were safely given over to the University of California. The nest was about seven or eight inches below the entrance and was composed of lichen, moss and feathers. Both parent birds approached closely and we were able to take some snaps of one as she returned to the nest time and time again. She seemed puzzled to find the nest opened up and would pull at the nest material, scolding all the time. Two other pairs of nuthatches were noted in the vicinity and were undoubtedly also nesting in the pine stubs.

On the same date we found a peculiar nest of the Red-shafted Flicker (*Colaptes cafer collaris*). There is a corral at the ocean end of one of the numerous valleys. The fence is one of the usual type of poorly constructed enclosures and had several old redwood posts of large diameter in the structure. A Flicker flew out as we went by, revealing a nest in one of the posts about four feet above the ground. It contained six fresh eggs, which were left undisturbed. A trip to the Point at a later date showed young just hatched and we hope the family was successfully reared.

On the same date, May 12, 1929, Gordon Bolander noted a pair of ducks fly by as we were leaving the lagoon near Drakes Bay. After hesitating as to whether we should retrace our steps, a lucky decision was made to go back and see what they were. Lucky indeed, for there was a pair of Blue-winged Teal (*Querquedula discors*) on the lagoon. This lagoon is fresh-water but occupies the mouth of a stream emptying into Drakes Bay during flood periods. The identification was easy, as we were able to get within three hundred feet of the birds and the binoculars showed the crescent in front of the eye very plainly. As they flew by we were able to see the light blue shoulders and other details.

On May 30, 1929, we found an interesting colony of nesting sea birds. About one mile north of the ocean end of Bear Valley is a point with two outlying rocks. There is a U. S. G. S. monument on the point, and it is quite prominent as viewed from either the north or the south. The Baird, Brandt and Farallon cormorants (*Phalacrocorax pelagicus robustus*, *P. penicillatus*, and *P. auritus albociliatus*) were occupying the shelf below the cliff; that is, more exactly, with the exception of the Baird Cormorants which were on the steep cliffs and not on the flat shelves. The

Farallon Cormorants had young at this date, some of which were about ready to leave the nest. The other two species had eggs.

Scattered among the cormorants were a few California Murres, but no eggs were seen. On the jutting rock at the extreme end of the point we noted four nests of the Western Gull (*Larus occidentalis*), each containing three eggs. This is an easy colony to see and there are probably many California bird students that have not the opportunity to visit the Farallon Islands who would seize the chance to visit

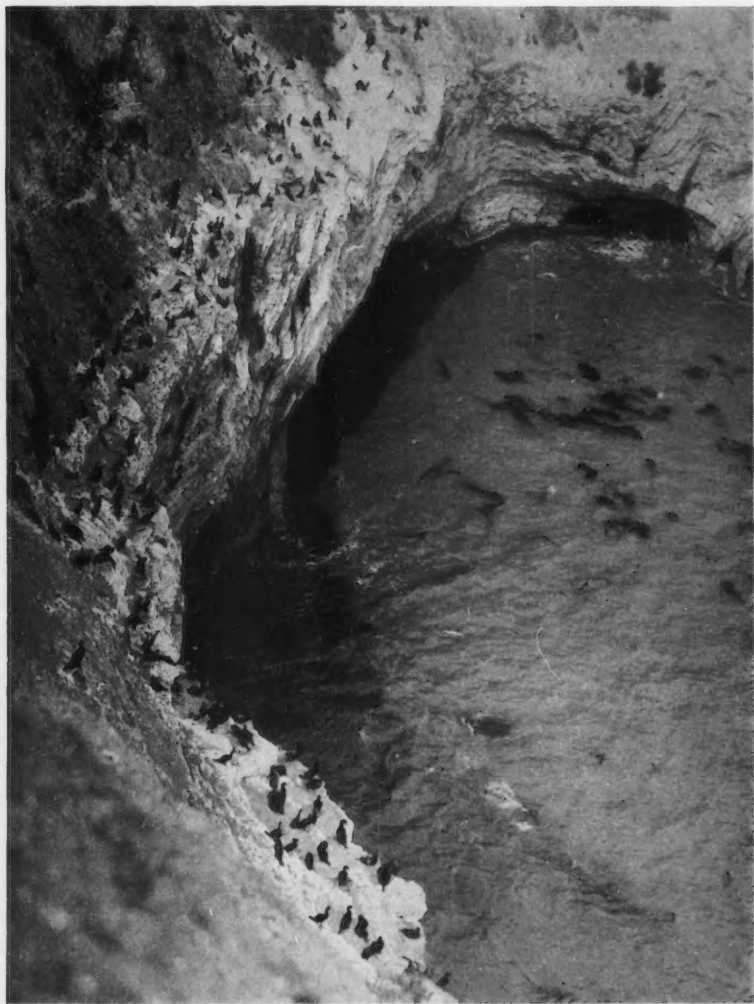


Fig. 28. CORMORANT ROOKERY NEAR POINT REYES, MARIN COUNTY, CALIFORNIA;
PHOTOGRAPHED MAY 30, 1929.

this point during the nest season.—L. PH. BOLANDER and CHARLES A. BRYANT, *Oakland, California, September 10, 1929.*

Some Shore-bird Notes from Ventura, California.—A few notes on certain species of shore-birds seen along the coast at Ventura, Ventura County, California, follow.

Surf Bird (*Aphriza virgata*). A flock of twelve Surf-birds was discovered along the rocky beach at Ventura on May 11, 1929. The birds were accompanied by several Black Turnstones. A male specimen was secured.

Ruddy Turnstone (*Arenaria interpres oahuensis*). An immature male Turnstone was collected on the bank of the Ventura River near its mouth on September 17, 1929.

Knot (*Calidris canutus*). A dead Knot in winter plumage was found on the beach at Ventura on September 16, 1929. The bird had become too decomposed to be preserved, but measurements taken tally for the species. A wing was obtained for reference.—JAMES STEVENSON, *Los Angeles, California, September 24, 1929.*

An Extension of the Range of the Band-tailed Pigeon and of the Lead-colored Bush-tit in Oregon.—While stopping at a sheep ranch in Catlow Valley, Harney County, Oregon, I was much interested in the numbers of magpies and blackbirds that came each morning to feed on the crushed oats placed in troughs for the sheep in one of the corrals near the house. The supreme surprise, however, came about sunrise on the morning of October 19, 1928, when a lone Band-tailed Pigeon (*Columba fasciata*) alighted on one of the corral posts for a moment and then joined the magpies at the feast from one of the grain troughs. The bird was collected and proved to be a male of the year, much emaciated in flesh. The ranch house is located at the west base of Steens Mountain about 160 miles east of the Cascade Range and about 200 miles east of any previously known record station for this species. The intervening territory is mainly an arid sage-brush desert.

The range of the Lead-colored Bush-tit (*Psaltiriparus plumbeus*) in Oregon has been known fairly well for some years as embracing the Steens Mountain district and west to and including the Warner Mountains in southeastern Oregon. It was with considerable interest that I learned that Mr. Harold Dobyns, of the Biological Survey, saw and watched a flock of ten or twelve of this species foraging in a clump of willows along Powder River near the town of Sumpter, Baker County, Oregon, on October 28, 1928. One bird was collected and preserved for identification. Sumpter is in the Blue Mountains and at least 80 miles north of previous record stations for this species.—STANLEY G. JEWETT, *Portland, Oregon, October 11, 1929.*

The Identity of *Ortyx leucopogon* Lesson.—In 1842, R. P. Lesson briefly described a quail collected about a year before by his brother, P. A. Lesson, at "San Carlos, Americae centralis Oceani Pacifici". For a few years thereafter this species remained in good standing. Then, no more specimens being taken anywhere in Central America, it was assumed, in spite of the pronounced characters evident in the two colored plates which had shortly followed the description, that the name really applied to the quail inhabiting western Panama. The colored plates of Des Murs and Gould were explained away as simply "a rather white-throated example of this [Panama] species" or even, and as it turns out very unjustly, as "probably improvements on nature."

Thus the matter has stood for nearly eighty years, for Gould in his great work on the American quails was the last authority of note to give to *Ortyx leucopogon* of Lesson its true value and characters. As will be seen, the resulting confusion was unnecessary, for in the first place the location of "San Carlos" was specifically stated as "San Carlos, prov. de San Salvador" in a preceding issue of the same magazine in which the species was subsequently described. Secondly, Lesson's description, while brief, applies well enough to the Salvador bird if the words "collari antici rufo" are interpreted to describe the reddish band across the upper chest.

When in Salvador in 1925 and 1926, the junior writer secured a series of 22 specimens of *leucopogon* which proved the correctness of the work of Des Murs and Gould. *Ortyx leucopogon* is the identical bird pictured by those two authorities. To make doubly sure, a specimen was sent to the Museum of Comparative Zoology for

¹ Contribution from the California Institute of Technology.

comparison with the skin in the Lafresnaye collection which almost certainly was the one from which Gould drew his plate. (See Todd, Revision of the genus *Eupsychortyx*, Auk, 37, 1920, p. 206.) Mr. Outram Bangs, after comparing the two, very kindly forwarded the skin we had sent him to the Paris Museum. Mons. J. Berlioz at the latter institution in turn compared it with Lesson's type and pronounced the two identical except that the type has the chest more definitely washed with rufous. In this respect it may be mentioned that there is a fair latitude of variation in the series at hand. Some have the foreneck and chest more reddish than others. There is also a good deal of individual difference in the spotting. Some have the foreneck and upper chest almost immaculate, while others are spotted much as in Gould's plate. Both Gould and Des Murs are wrong in one respect. The former shows the crest too long, the latter shows no crest at all. As a matter of fact, *leucopogon* has a short crest like *leylandi* and *hypoleucus*, thus removing any necessity for recognizing a separate genus ("*Eupsychortyx*" Gould) for the crested bob-whites of northern South America.

The synonymy of *Ortyx leucopogon* is a short one, for the name was correctly applied only for a matter of some eight years. Omitting those items of no bearing on the systematic status, it is:

"*Ortyx albifrons* Lesson" Lafresnaye, Rev. Zool., 5, April, 1842, p. 130 ("San Carlos, prov. de San Salvador") [nomen nudum].

Ortyx leucopogon Lesson, Rev. Zool., 5, June, 1842, p. 175 ("San Carlos, Americae centralis Oceani Pacifici" [= La Union, Salvador]); Des Murs, Icon. Orn., livre 6, August, 1846, pl. 36 and text ("San Carlos").

Eupsychortyx leucopogon Gould, Mon. Odontoph., 1850, pl. 13 and text ("San Carlos").

In actuality, *leucopogon* is simply a more reddish colored, white-throated *leylandi*, or to put it the other way around, *leylandi* is a darker (more brownish), dark-throated race of *leucopogon*. The latter merges completely with *hypoleucus* so that instead of three "species" on the Pacific Coast of Central America there are, in actual practice, three races of one species. Their ranges are approximately as follows.

Colinus leucopogon leucopogon (Lesson). El Salvador, east of the Lempa River.

Colinus leucopogon hypoleucus (Gould). El Salvador, west of the Lempa River, and western Guatemala.

Colinus leucopogon leylandi (Moore). Northwest Costa Rica and western Nicaragua.

It naturally follows that the quail of western Panama must bear some name other than the one which has so long been mis-applied to it. In view of the confusion which has existed it seems preferable to describe it and name a type rather than to simply give a new name. It may be known as

Colinus leucotis panamensis, subsp. nov. Panama Bob-white

Type.—Male adult, no. 26082, collection of Donald R. Dickey; Aguadulce, Cocle, western Panama; altitude 50 feet; September 26, 1925; collected by Rex R. Benson; original number 1883.

Subspecific characters.—Similar to *Colinus leucotis leucotis* (Gould) of the Andean region of Colombia, but coloration very much darker throughout; ground color of underparts darker and very much redder, with the lighter markings reduced to roundish spots instead of occupying most of the individual feathers. The head pattern in the males has much more of white, with consequent restriction of red; the anterior half of throat, the loreal region, superciliary to above center of eye, forehead, center of crown, post-ocular streak and most of the auriculars, soiled white.

Range.—Lowlands of the Pacific side of western Panama. Known at present only from the departments of Cocle and Veragua.

Remarks.—The *leucotis* group of forms is evidently specifically distinct from the *leucopogon* series by reason of the decidedly longer crest, the white instead of dusky post-ocular streak and the reddish instead of white superciliaries. We follow Todd in considering *leucotis* specifically distinct from *Colinus cristatus* (Linnaeus) and *Colinus sonnini* (Temminck).

The new form is, of course, the "*leucopogon*" of recent authors, but not of Lesson, Des Murs and Gould.—DONALD R. DICKEY and A. J. VAN ROSSEM, Pasadena, California, November 30, 1929.

EDITORIAL NOTES AND NEWS

The Cooper Club's business staff has been augmented by the addition to it of Mr. John McB. Robertson. Under the title of Assistant Business Manager, Mr. Robertson will take over from Mr. W. Lee Chambers certain of the routine that has fallen to the latter's lot in increasing measure the past year or two. It should be fully realized by our membership that every hour of service rendered by each of our business managers is an outright gift to the Club; there is no compensation forthcoming beyond the satisfaction in helping along a worthy enterprise. And further, the recent notable growth in the size of *The Condor* has meant commensurate increase in the amount of business to be transacted. We can here suggest a way for everyone to cooperate, namely, by responding promptly to whatever Club notices our business managers find it in their province to send out.

Mr. Robert T. Moore, trochilidist, returned in November from a six months expedition into the high Andes of Ecuador. His party procured approximately 3000 specimens of birds, besides much other natural history material. Of hummingbirds, it proved possible to make exhaustive life-history studies of the rare *Metallura primolina* and *Chalcostigma herrani*, the latter found close to the snow line on the active volcano, Mount Sangay. Mr. Moore has recently associated himself with the department of vertebrate zoology at the California Institute of Technology, Pasadena.

The stimulus furnished last year by Mr. John G. Tyler, President of the Northern Division of the Cooper Club, has resulted in disclosing widespread interest on the part of Club members toward more effective bird conservation in California. Mimeographed ballots have been sent to members residing in California, in order to give them an opportunity to indicate their willingness to help in the work. Returns are now coming in. Any person who has not received one of these ballots, or who would like further information concerning the project, or who has any sort of pertinent suggestion to offer, is invited to communicate with the Bird Conservation Committee of the Northern Division, through its chairman,

Mr. Jean M. Linsdale, Museum of Vertebrate Zoology, Berkeley.

Pacific Coast Avifauna No. 19 was formally issued on December 27. This is Messrs. Jewett and Gabrielson's "Birds of the Portland Area, Oregon", consisting of 54 pages of text, with 21 halftone illustrations. While of greatest immediate interest to bird students residing in the Pacific Northwest, ornithologists generally will wish to complete their files of the series in which this contribution appears. Copies may be had from Mr. W. Lee Chambers.

An account of the unusual movement or migration of Canada Jays that has been taking place in parts of their general range since last summer, and is still going on, is being prepared by Doctor Harrison F. Lewis, National Parks of Canada, Ottawa, Canada, who will appreciate any information, however scanty, relating to this subject.

MINUTES OF COOPER CLUB MEETINGS

SOUTHERN DIVISION

SEPTEMBER.—The regular monthly meeting of the Southern Division of the Cooper Ornithological Club was held on September 27, 1929, at 8 p. m., at the Los Angeles Museum, Los Angeles, California, with Vice-President Willett presiding. The minutes of the June meeting of the Southern Division were read and approved, there having been no meetings during July and August. The minutes of the August meeting of the Northern Division were read.

Mr. M. P. Skinner, resident in the Yellowstone National Park for many years, was the speaker of the evening. His subject, "Animal Life in the Yellowstone Park," was beautifully illustrated with colored slides prepared from photographs taken by Mr. Skinner himself. Many of these, such as his prized picture of the coyote, were the results of years of photographic effort. Most of the pictures were of the large animals of the Park, such as the sheep, deer, elk, moose, antelope, bear and coyote. The talk that accompanied this continuous succession of slides was in itself an interesting, well or-

ganized and informative lecture, not leaning too heavily upon the slides for support.

Adjourned.—HAROLD MICHENER, *Secretary*.

OCTOBER.—The regular monthly meeting of the Southern Division of the Cooper Ornithological Club was held on October 29, 1929, at 8 p. m., at the Los Angeles Museum, Exposition Park, Los Angeles, with Vice-President Willett presiding and about thirty-five members and friends present. The minutes of the September meeting of the Southern Division were read and approved. The minutes of the September meeting of the Northern Division were read.

The following applications for membership were read: Frederick P. Browne, M. D., 19 Croade St., Warren, R. I.; Dorothy Burgess, 220 South J Street, Madera, Calif.; Early Martin, Jr., 1909 Rio Grande St., Austin, Texas; Miss Ethel Adele Capen, 477 South Hudson Ave., Pasadena, Calif.; Irene M. Wilson, 247 Stedman Place, Monrovia, Calif.; Gerald B. Thomas, Jr., 1454 W. 53d St., Los Angeles, Calif.; Miss Lois Adelaide Book, 733 Franklin Street, Columbus, Indiana; Fred Bradshaw, Director Provincial Museum Normal School, Regina, Sask., Canada (all these proposed by W. Lee Chambers); Mrs. Ethel W. Shuey, 12763 Kling St., North Hollywood, Calif., and Dr. S. A. Watson, Whittier College, Whittier, Calif., both proposed by Loye Miller; Florence Knox, Hyland Apts., Salt Lake City, Utah; W. J. Sheffler, 215 W. 15th St., Los Angeles, Calif., proposed by J. Stuart Rowley; W. Warner Wilson, Box 128, Davis, Calif., proposed by J. Eugene Law; Mrs. Frank W. Commons, Crystal Bay, Minnesota, proposed by Harold Michener.

Mr. Law announced the receipt of the names of the newly elected officers of the American Ornithologists' Union, reading the list. It was a pleasure to learn that Dr. Joseph Grinnell had been elected president.

Mr. Herbert N. McCoy, the speaker of the evening, gave an entertaining talk on the birds and animals of the Canal Zone, particularly those that he encountered on Barro Colorado Island during a three months stay there last winter. At the laboratory maintained there by the Institute for Research in Tropical America, he had an opportunity to study and photograph many forms of tropical

life which he described to his audience largely by means of extracts from letters written at the time. This interesting talk was followed by a series of excellent photographs projected onto the screen.

Adjourned.—HAROLD MICHENER, *Secretary*.

NORTHERN DIVISION

SEPTEMBER.—The regular monthly meeting of the Northern Division of the Cooper Ornithological Club was held on September 26, 1929, at 8:00 p. m., in Room 101, Zoology Building, University of California, Berkeley, with eighty members and visitors present. At the request of Vice-president Clabaugh Mr. Grinnell occupied the chair. Minutes of the Northern Division for August were read and approved.

Proposals for membership were: Miss Barbara D. Blanchard, 1524A Oxford St., Berkeley, by Margaret W. Wythe; Mr. W. B. Davis, Route 2, Oroville, and Miss Victoria E. Gillmeister, 405 Meridian Rd., San Jose, by J. Grinnell; Mr. Lionel A. M. Peake, Post Box 368, Nanaimo, British Columbia, by Allan Brooks.

Several interesting reports were made by members: Mr. Clabaugh told of the picking up, on Vancouver Island on July 2, 1929, of a Nuttall Sparrow banded by himself in Berkeley on December 14, 1928; Miss Stedman told of observing an individual Song Sparrow in her garden over a period of four years, identification being made possible by a certain blemish. An early Killdeer was reported on the field near Hilgard Hall; while Miss Wythe announced that on September 25 a Western Flycatcher was still lingering on the campus. One member exhibited a feather, apparently of the Varied Thrush, picked up a few hours earlier on a campus lawn, and asked whether it would be accepted as evidence of the arrival of the bird. The question was left open. Mr. Wanzer described a hummingbird which he had watched about a blossoming lavender bush at Pacific Grove between the fourth and the twenty-seventh of August. Observed at close range the bird appeared to have a patch of white feathers on the forehead and two white feathers on each side of the gorget. A note from Miss Werner was read delineating the slow-motion activities of an Anthony Green Heron at the Second Lake in Golden Gate Park.

The evening's talk was by Mr. Chester Lamb upon fifty-one weeks of field work

in the Cape region of Lower California. Mr. Lamb described the salient features of the mainland and the bird rookeries of Isabella Island. Many rare birds were exhibited, such as the Mangrove Warbler and the Mexican Grebe, and their haunts and habits were pictured by Mr. Lamb, whose hearers shared the thrill of "shining" Elf Owls at night in trees above rattlesnake-infested ground.

Mr. and Mrs. Charles C. Sperry of Washington were guests of the Northern Division for the evening. Mr. Sperry is engaged this summer in reconnaissance work in the western states for the Biological Survey.

Adjourned.—HILDA W. GRINNELL, *Secretary*.

OCTOBER.—The regular monthly meeting of the Northern Division of the Cooper Ornithological Club was held on October 24, 1929, at 8:00 p. m., in Room 101, Zoology Building, University of California, Berkeley, with about one hundred members and visitors in attendance. Vice-president Clabaugh occupied the chair. Reading of all minutes was omitted. Proposals for membership were as follows: Jack Arnold, 2525 N. McCall Ave., Selma, Calif., by John G. Tyler; Miss Fanny Hodges, Box 34, Halcyon, San Luis Obispo Co., Calif., by C. A. Harwell; Donald McLaughlin, Goat Island, San Francisco, Calif., by Edith A. Pickard.

Mr. Joseph Mailliard reported upon bird banding in Marin County and Mr. Clabaugh upon banding in Berkeley. It was reported that Mr. Charles A. Bryant had recently seen a pair of Wood Ducks on Phoenix Lake, near Ross, Marin County. Dr. H. C. Bryant reported that the Black-billed Magpie first seen by him in North Berkeley on Thanksgiving Day of last year is still at large in the same vicinity. He added that it is apparently one of two young birds brought to Berkeley from the state of Washington in the summer of 1928, and known to have escaped from captivity.

Mr. Francis P. Farquhar then presented to the meeting a most interesting account of the Whitney Survey of California and of the personalities of the men who carried out the work. Some entertaining extracts were read from the journal of one of the members, William H. Brewer. Following the talk a series of beautiful colored slides of the Sierra was shown. Some of these were made

from photographs taken by Mr. Farquhar himself, while others were from the collections of fellow-members of the Sierra Club.

Adjourned.—HILDA W. GRINNELL, *Secretary*.

NOVEMBER.—The regular monthly meeting of the Northern Division of the Cooper Ornithological Club was held on Tuesday evening, November 26, 1929, at 8:00 p. m., in Room 101, Zoology Building, University of California, Berkeley, with Vice-president Clabaugh in the chair and about fifty members and guests present. Minutes of the Northern Division for October were read and approved. Minutes of the Southern Division for October were read.

Mr. C. A. Harwell reported upon the progress of the voting for the State Bird and announced that the Valley Quail is leading by a very large majority. Mr. Mikesell told of meeting with a Road-runner on the Wildcat Canyon road, back of Berkeley, on Sunday afternoon, November 17, and of watching it in flight down the hillside. Mr. Cain said that during the past summer a Road-runner had been reported several times from the vicinity of Leona Heights Quarry and from the Livermore hills; he also told of noting Killdeer, Pipits and Juncos on the field at the Stanford stadium during the football game. On November 17, Mr. C. A. Bryant watched a Pigeon Hawk at Phoenix Lake, diving repeatedly into a flock of Pipits but securing none. On the same date Mr. Clabaugh saw a Road-runner in Wildcat Canyon, probably the same bird seen by Mr. Mikesell; and on the road farther east into the hills beyond San Pablo dam he observed four Great Horned Owls. Mrs. Allen reported the usual fall birds present at Saratoga, but in unusual abundance.

Mr. Swarth exhibited with pride a rare volume, a prodrome of one of Elliott Coues' papers on Arizona birds, issued by the author in 1866.

The paper of the evening was read by Mr. Alden H. Miller and dealt with his studies of the habits of the Loggerhead Shrike, carried on both in the field and in the laboratory. Mr. Miller's careful and detailed observations were of much interest, and those concerning the impaling of food were, at the close of the meeting, most ably verified by an enthusiastic young shrike.

Adjourned.—HILDA W. GRINNELL, *Secretary*.

